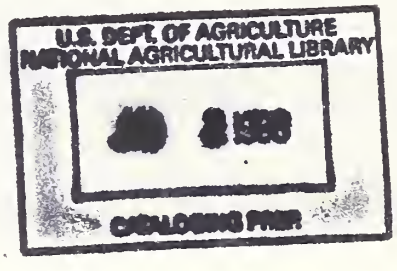
THE ECONOMICS OF FARM PRODUCTS TRANSPORTATION



MARKETING RESEARCH REPORT NO.843 ECONOMIC RESEARCH SERVICE U.S. DEPARTMENT OF AGRICULTURE

FOREWORD

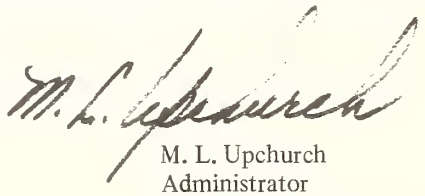
The Economic Research Service is responsible for a broad research program in economics and the related social sciences designed to benefit agriculture and the general public. Research on the economics of transportation of farm products is included in that program. An important part of the program is to develop new and better ways for solving key problems. Basic research to develop new principles and new methods of analysis is fully as necessary in the social sciences as in the physical and biological sciences.

It is a policy of ERS to provide the opportunity for competent research workers to receive special research assignments for periods up to 6 months to concentrate on fundamental problems where they have an intense interest and when the research promises to have significant long-term benefits to agriculture and the general public. The purposes of these assignments are: (a) to push forward the frontiers of theory and quantitative analysis; (b) to encourage individual initiative; (c) to enable individual social scientists to work on broad problems which may extend beyond the areas assigned to their projects, their Branches, or even their Division.

This report was prepared under a basic research assignment from the Economic Research Service. The views are those of the author. They do not necessarily reflect the views and policies of the U.S. Department of Agriculture because the Department takes account of many considerations other than those specifically related to transportation economics in arriving at policies with respect to transportation of agricultural products.

This report makes a significant contribution to the literature of economics, especially transportation economics. Transportation is a big item of cost to agriculture and transportation of farm products is a big item of revenue for carriers. Both operators and users of transportation have struggled with unique economic problems for many years. Careful reading of this report by layman and professionals will promote better understanding of economic factors affecting the operation of our transportation system. Among other results we hope this report will prompt other scholars to study and write on transportation economics.

Use of the name of a particular company or type of equipment in this report does not constitute endorsement or imply discrimination against other companies or types of equipment.



M. L. Upchurch
Administrator
Economic Research Service

Washington, D.C. 20250

March 1969

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402

PREFACE

Many reports have been written about the economics of transporting unmanufactured farm products from origin to destination by rail, truck, barge, or air. These reports dealt with only one or two modes of transportation; this report describes all four, but focuses mainly on rail, truck, barge, and combination truck-barge transport.

Makers of public policy have recognized the special needs of agriculture for transportation service by allowing truck and barge operators—but not rail carriers—substantial freedom from regulation in competing for interstate shipments of unprocessed farm products.

Arguments are frequently presented that defend or attack these provisions, but where they draw on economic theory in support of either side of the argument, the assumption is generally implicit that existing general economic theory can be applied without modification to these special conditions. The analysis undertaken here shows why this is not the case.

The existing literature on transportation theory underlies what is written here, but important modifications of existing theory were required, both to explain the forms which intermodal competition for unprocessed farm products took and to explore the potential development of competition. While these modifications apply directly to transportation markets where truck and barge competitors are free from regulatory controls, much of the analysis has implications for other traffic. Recent technological changes in the physical capabilities and competitive effectiveness of the major modes of transportation—either singly or in combination—also apply to the Nation's entire transportation system.

For readers interested only in a short history of the development of farm product transportation and the current status of that segment of the transportation industry, chapters 6 and 7 may be omitted without loss of continuity. These chapters discuss the economic theory.

A number of persons helped me with this research but by far the most assistance was supplied by Ann Ulrey—an economist—who contributed substantively to the work.

CONTENTS

		Page
	Summary	v
Chapter 1	The Importance of Farm Product Transportation	1
	The Importance of Transportation to Agriculture	1
	The Importance to Carriers of Farm Product Transportation	4
	Capabilities of Rival Carrier Types	6
Chapter 2	The Background of Unequal Regulation	12
	Traffic Trends Among Carrier Types	12
	The Regulatory Status of Carrier Types	14
	Background of Regulation	16
Chapter 3	Farm Product Transportation as a Competitive Industry	20
	Measuring Competition from the Standpoint of the Carriers	20
	Measuring Competition from the Standpoint of Transportation Users	23
Chapter 4	Competitive Pricing—Problems and Implications	28
	The Desirability of Competitive Pricing	28
	Industry Structure and Ability to Compete	30
	Significance of Size Differences for Intermodal Competition	33
Chapter 5	Ratemaking and Carrier Costs	36
	Cost Structure Differences	36
	Capacity Adjustment Differences	40
	Cost and Pricing Implications of Excess Rail Capacity	42
Chapter 6	The Characteristics of Intermodal Competition	45
	The Competitive Model	45
	Taking Account of Regulatory Inequalities	46
	Taking Account of Cost and Capacity Adjustment Differences	46
	Defining Markets in Which Intermodal Competition Exists	47
	Identifying Zones of Competition	48
	Geographic Aspects of Demand Elasticity	50
Chapter 7	The Division of Traffic Among Carrier Types	52
	Traffic Allocation Under Condition of Unequal Regulation	58
	Significance of Common Carrier Obligations	59
	The Economic Efficiency of Intermodal Traffic Allocation	60
	Rate Determination and Traffic Allocation	63
Chapter 8	The Geography of Intermodal Competition	66
	Geographic Factors as Determinants of Intermodal Competition	66
	Service Differentials as Determinants of Intermodal Competition	70
	Implications for the Theory of Intermodal Competition	75
Chapter 9	The Dynamics of Intermodal Competition	76
	Observations of Intermodal Competition	76
	Rail Response to Intensified Competition	78

Page

Chapter 10 The Future of Competition 88
Adequacy of Multimodal Competition 88
Economic Advantages 89
Potential Advantages 90
Some Views on Reduced Regulation of Rail Ratemaking 91

Chapter 11 Intermodal Competition—An Overview 92
Developments 93
Achievements 94
Limitations 94

SUMMARY

Improvements in highway and waterway transportation since the 1930's–and more particularly since the mid-1950's–have constantly increased the number of farm products shippers coming within the geographic range of truck, barge, or combined truck-barge service to markets. To many shippers formerly served exclusively by rail carriers, intermodal competition has brought lower shipping charges or has offered access to more distant markets.

In moving traffic for which motor or water carriers compete actively, shippers of farm products pay freight charges which approximate the lowest rates at which these carriers are prepared to offer service. This is because makers of public policy, recognizing the need of agriculture for transportation service that is flexible both in timing and in localities served, allow truck and barge operators substantial freedom from regulation in competing for interstate shipments of unprocessed farm products (exempt agricultural commodities). Since transport by both highway and waterway–especially that offered to shippers of agricultural products–is furnished by numerous operators competing vigorously with each other, their charges may be expected to reflect quite closely their costs for moving specific traffic. The empirical evidence presented in this study generally confirms that expectation.

As a result of intermodal competition, the transportation charges now paid by shippers in different localities for moving their output to markets and processing centers (also in different locations) have come into much closer alinement with the unequal costs of transportation for disparate traffic movements. These differences in transport charges reflect distance, terrain, accessibility to waterways, and the availability of equivalent traffic volume moving in both directions. It appears that intermodal competition has brought a net economic gain, reducing the aggregate transportation bill for hauling farm products and improving the quality of service. Nonetheless, not all shippers, processors, and middlemen directly benefit from realinements in transportation services and rates.

While most shippers of farm products have realized substantial savings on transportation charges, benefits from intermodal competition appear to have been limited to some extent by the continuing regulation of rail carriers. Freight charges for traffic that is subject to active intermodal competition generally reflect the lowest rates at which truck or barge operators (singly or in combination) would be prepared to offer service.

Railroads, unlike competing carriers, usually have substantial unused capacity for moving additional traffic. Many costs associated with maintaining and operating the Nation's rail system are not reducible so long as operations over that system are maintained, even at much less than full capacity. Since additional traffic could be moved without adding to these fixed costs, railroads may benefit by competing for traffic at any rate that exceeds their additional handling costs. Furthermore, since the fixed costs for a given level of rail capacity cannot be adjusted downward, except by abandoning service entirely over parts of the system, incentives to continue moving this traffic at rates low enough to retain it may persist indefinitely.

Transportation laws and regulatory policies since 1958 have permitted the rail carriers to maintain volume by reducing rates to levels that approach variable costs when necessary, but not to levels which might substantially eliminate competing modes from a particular traffic movement. According to the data presented here, rail responses to intermodal rate competition have been limited by the cost levels of competing carriers, and this pattern of restricted rate reductions has limited the immediate saving on transportation charges to shippers made possible by intermodal competition.

Continuing restraints through law and regulatory policy over ratemaking by railroads appear to reflect the fear that rail carriers, if free to eliminate competition from certain traffic movements, would be in a position to monopolize some shippers' trade. Those who have such fears overlook the fact that railroads no longer enjoy a

substantial technological advantage over other modes. Detailed analysis of intermodal competition indicates that these fears are exaggerated.

The analyses presented here show how intermodal competition divides traffic among the carrier types according to a geographic pattern. Each mode enjoys inherent advantages in moving traffic of certain types over certain routes and for certain distances. For many farm products, truck operators provide substantially all short-haul service while rail carriers continue to dominate shipments moving for long distances. Traffic movements over intermediate distances are the most actively contested, and the limited rate responses rail carriers have made to inroads by competitors typically resulted in a continuing division of most such movements between two or more carrier types. More aggressive competitive ratemaking by rail carriers would not eliminate competing modes from all movements of a given farm product; instead, it would increase the ability of the rail carrier to compete successfully for shorter hauls, just as technological improvements have historically increased the traffic distances for which truck and barge operators are able to compete.

For-hire truckers possess great flexibility in geographic territories served, amount of equipment used, and service provided. Under these circumstances, even if a railroad obtained all of a specific movement by underbidding other carriers, potential competition would remain an effective barrier to the establishment of monopoly rates. Truck operators could exploit any attempt by rail carriers to raise rates or curtail service in ways which provided profit opportunities, even on a temporary basis. The ready availability to many shippers of transportation equipment by either purchase or lease also protects advantageously located producers against losing benefits made possible through the development of improved highway and waterway transport.

THE ECONOMICS OF FARM PRODUCTS TRANSPORTATION

By Ivon W. Ulrey[1]

CHAPTER 1.–THE IMPORTANCE OF FARM PRODUCT TRANSPORTATION

The business of transporting commodities of all types has become increasingly competitive in recent years. Technological developments have improved the service and widened the geographic range of highway, barge, and air transport. Faced with loss of traffic to other carriers, the Nation's rail carriers have responded with important innovations in traffic movement and freight handling. Combination hauls using more than one mode of transport for different portions of a single freight movement became both feasible and frequent. As a result of such developments since 1930–especially since the midfifties–more and more shippers enjoy a wider range of transportation alternatives, often to a wider range of destinations, and competition between two or more modes of transportation has increasingly extended into areas formerly served by only one type of carrier.

Shipments of all types have been affected by these technological developments. In the case of farm products, however, the geographic extent and economic impact of such developments were greatly enhanced by the unusual importance of transportation to agricultural producers, processors, and consumers and also by notable differences in the degree of regulatory control applicable to the movement of most unprocessed farm products (exempt agricultural commodities). In competing for such traffic, truck and barge operators–though not railroads–generally enjoy much wider latitude in pricing their services than they do for most commodities. This relatively greater freedom by some carriers to compete for farm traffic reflects legislative recognition that agricultural demands for transportation service are characterized by special needs and problems.

Recent trends in competition for farm traffic have had substantial impact on both shippers and carriers, and such changes have, in turn, generated important policy controversies. Analysis of these trends and controversies requires an understanding of the role transportation plays in producing and distributing the Nation's agricultural output and of the ability of the various modes of transportation to compete for this traffic.

The Importance of Transportation to Agriculture

The special characteristics which make agricultural producers uniquely dependent on an adequate and flexible transportation system may be grouped in two categories. One is the extent to which agricultural products depend on geographic movement to acquire their market value. Frequently, these movements are over long distances, and perishable commodities have very short time tolerances. The other, even more critical, is the extent to which climate or weather determines where, when, and in what quantities transportation services will be needed. Similar problems confront producers and users of nonagricultural commodities, but in agriculture they are continuously present and the producer's dependence on their successful resolution is so great in degree that it constitutes a difference in kind.

[1] Professor, Navy Management Systems Center, U.S. Naval Postgraduate School, Monterey, Calif. The basic research assignment for conduct of this study was undertaken while the author was an Agricultural Economist, Marketing Economics Division, ERS.

Transportation As a Share in the Market Value of Farm Products

Farm products depend on transportation more than manufactured goods for the creation or preservation of their value. Place utility—the value added to goods by moving them from where they are abundant relative to demand to where they are less so—constitutes a much higher share of their final price. Table 1 shows this dependence by relating freight revenues received by railroads from various categories of commodities to the wholesale value of these groups at destination. For products of agriculture, over 8 percent of that value represented freight charges in 1959—the last year for which these data were available. This was much less than the value for mine and forest products, but more than double that for manufactured goods.

While these figures apply directly only to goods moving by rail, the relationship for those moving by other modes of transportation is also high, particularly truck shipments which may include perishable produce where speed and special service are essential. Table 2 shows that transportation costs generally make up a higher share in the market value of perishable commodities. The table shows a wide range of dependence on transportation service; the ratios range much higher for perishable than for semi-perishable products. For both categories, shipping costs represent a much higher share of final price than for manufactured goods.

Increases or decreases in transportation charges consequently have a greater potential impact upon the farmer than on most users of transportation. Consider a single product, such as potatoes, where transportation charges average nearly 30 percent of the wholesale price—about half as much as the grower receives. To the grower, a 10-percent saving in transportation costs could mean almost a 5-percent increase in his sale price, if other costs and prices did not change.

Depending on market conditions, savings in the cost of distribution might be divided among growers, consumers, and intermediaries. Even the carrier making the rate reduction might benefit if the lower price sharply increased the volume of potatoes hauled. This would be particularly true if such traffic increases permitted better use of existing or more efficient equipment. For the country as a whole, this gain might be partly offset if competing producers in another part of the country and the carriers serving them suffered cutbacks in the volume of potatoes shipped. But if—as is likely—the outcome of the whole series of adjustments was more total production, more traffic for carriers, and more (or better quality) products at a lower price to the consumer, the result would be a net economic gain. (This might be true only in the long run and only for the economy as a whole.) Conversely, relatively small increases in transportation costs can have equally complex and widespread repercussions.

Service Requirements of Farm Product Transportation

Important though it is, the high ratio between transportation charges and final market values is not the most significant aspect of agriculture's dependence on transportation service. Agriculture's demands upon transportation are seasonal, variable, and so unpredictable that they require a high degree of flexibility on the part of carriers.[2] Producers can control these uncertainties only to a very limited extent.

Crops mature when nature dictates, and the timing in specific locations is not the same each year. Harvests may be abundant one year in one area and poor in another area, while the reverse may be true the following year. Other areas may become more or less important sources of supply. Nature determines to a very large degree how much transportation will be needed, when it will be needed, and where it will be needed. The most sophisticated computer system cannot forecast the amount, timing, or physical dispersion of transportation needed for major crop movements.

To illustrate the impact of weather upon transportation needs, suppose that the Red River Valley's potato crop fails because of inadequate rainfall. This means hard times for potato producers there, but it means better than expected times for potato growers in California, Colorado, Idaho, Maine, and New York, if weather in those areas has been favorable. It also means much less need for potato transportation out

---

[2] Committee on Interstate and Foreign Commerce. National Transportation Policy. pp. 720-727. U.S. Senate. 87th Cong., 1st Sess. Jan. 3, 1961.

John O. Gerald and Mildred R. DeWolfe. The Freight Car Situation and Prospects. U.S. Dept. Agr. Econ. Res. Serv ERS-331. 1966.

Table 1.–Rail freight: percentage ratios of revenues to wholesale values at destination by commodity groups, selected years

[Discontinued after 1959]

Commodity	1950	1953	1956	1959
	Percent			
Products of–				
Agriculture	6.33	7.16	7.44	8.20
Animals and livestock	2.88	3.66	4.14	3.96
Mines	28.59	25.27	24.36	28.13
Forests	12.66	13.06	14.57	14.21
Manufacturers and miscellaneous	4.27	4.14	3.98	3.94
Less-than-carload lots	1.85	2.46	2.50	2.74
Total	5.51	5.64	5.74	5.77

Source: Freight Revenue and Wholesale Value at Destination of Commodities Transported by Class I Line-Haul Railroads, 1959, Bureau of Transport Economics and Statistics, ICC Statement No. 6112, File No. 18 - C - 23, October 1961, Washington, D.C.

Table 2.–Rail freight–Percentage ratios of revenues to wholesale values at destination for 12 large-volume farm products and for 12 perishables, 1959

[Discontinued after 1959]

12 large-volume semiperishable farm products	*Percent*
Wheat	10.07
Corn	12.18
Animal and poultry feed	6.42
Food products in cases and packages, not frozen	3.49
Sugar beets	9.51
Wheat flour	7.48
Soybeans	5.52
Sorghum grains	15.81
Soybean oil, cake, and meal	10.14
Mill products, cereal, etc.	15.25
Barley and rye	17.06
Cotton in bales	2.19

12 perishable farm products	*Percent*
Meats, fresh	4.17
Potatoes	27.45
Cattle and calves (single deck)	4.48
Oranges and grapefruit	23.59
Swine (single deck)	8.14
Sheep and goats (single deck)	5.88
Tomatoes	14.88
Apples, fresh	20.67
Poultry, live	2.78
Watermelons	37.53
Eggs	6.38
Berries, fresh	2.02

Source: Freight Revenue and Wholesale Value at Destination of Commodities Transported by Class I Line-Haul Railroads, 1959, Bureau of Transport Economics and Statistics, ICC Statement No. 6112, File No. 18 - C - 23.

of the Red River Valley and greater need for it out of other producing areas–including transportation to destinations not ordinarily served.

Demands for transportation are also affected by the fact that potato varieties from different producing areas are not perfect substitutes for each other. Some bake better than others, while some are preferred for making potato chips. But the desirability of each area's crop for each of these uses also varies from season to season and affects the pattern of transportation services required. So do changes over time in the relative importance of the various uses. Increased potato processing, for instance, greatly reduces the perishability factor in shipments to consumer markets, but introduces a new set of shipping needs.

Add to these complexities the problems of timing. Not only do demands on suppliers of transportation services fluctuate widely and unpredictably, but shippers must depend on having those services available in adequate quantity when and where they are needed. In many cases, a saving of hours– not days or weeks–in transportation time can mean better prices for the producer or distributor, longer shelf life for the product, and better satisfied consumers. Stated the other way around, when transportation service is needed and is not available, the effect is loss of market value in part or in full. This means loss of income to agricultural producers and to those between them and the consumer; for the consumer it means higher prices, lower quality, and smaller supply.

While time tolerances for particular shipments vary with the product's perishability and its stage of

processing, produce must be moved promptly, not only from field to assembly plant, but also through all subsequent channels of distribution to the consumer. At each stage of these movements, the equipment demand depends on the degree of processing and often on weather as well.

These complex requirements confront carriers with changing demands for service which likely are either more than they can meet or less than enough to keep their equipment busy. Despite efforts to mobilize capacity during harvest season, including the diversion of equipment from other traffic, delays and losses occur in almost every harvest season in at least some areas from shortages of rail freight cars for moving farm products. On the other hand, provision of enough rolling stock to handle peak seasonal loads promptly would greatly increase the burden of idle equipment for the carriers during much of the year.

Thus agriculture's high degree of dependence on the availability of transportation generates demands which carriers often find it difficult to meet. The geographic pattern of transportation needed in distributing the Nation's agricultural output varies greatly from year to year; the timing of annual peak needs is uncertain, and so is the quantity of service likely to be demanded in any geographically limited area, such as that served by a single carrier. By comparison, most nonfarm businesses can better control their transportation needs, largely because they can plan and forecast those needs more accurately. Despite technical improvements in the storage life of many perishables, agriculture's needs for seasonal transportation remain urgent in terms of time, and are largely unpredictable.

Legislative Recognition of Agriculture's Needs

Historically, the dependence of farm shippers upon rail carriers to move their produce to market made them feel highly vulnerable to monopolistic pricing practices. The first laws regulating transportation rates and services were adopted late in the 19th century, largely in response to demands by the so-called Granger movement for some counterweight to the monopoly then possessed by the railroads.

By 1935, trucking had become an important part of the Nation's transportation system, and legislation establishing regulatory policies for highway transport was enacted. At that time, Congress recognized that uncertainties as to the amount of service required by farmer shippers, its timing, and geographic pattern put a premium on flexibility, both for operations of carriers and in bargaining by shippers and carriers.[3] Motor carriers hauling unprocessed farm products were exempted from economic regulation. The provisions for barge traffic, applied somewhat later, differed considerably in detail but were similar in intent.[4] Corresponding bargaining flexibility has never been extended to railroads, but the ability of rail carriers to respond to competition from other modes has been increased to some extent by recent enactments.[5]

The combination of continuing technological progress with wide competitive latitudes on the part of some carrier types has produced a form of intermodal competition for farm product traffic that differs sharply from regulated monopoly and also from concepts of perfect competition. It has not followed any of the patterns suggested by monopolistic and imperfectly competitive models for industrial situations. Its particular characteristics—geographic spread, market impact on shippers, carriers, and consuming public, effectiveness, imperfections, and continuing direction of development—form the major subject of this study.

The Importance to Carriers of Farm Product Transportation

The emergence of strong and effective competition for any specific traffic movement depends on two conditions. First, the traffic must be sufficiently attractive to provide carriers with incentives to compete. Second, the relative advantages and disadvantages (including cost) of the service offered by competing carriers must provide shippers with effective alternatives. The intermodal competition that has already emerged for much agricultural traffic and is extending around a widening geographic periphery shows that alternative carrier types have both the incentive and the ability to compete.

Carriers are attracted by the great volume of agricultural traffic available to be hauled. Dollar

---

[3] Celia Sperling. Agricultural Exemption in Interstate Trucking, A Legislative and Judicial History. U.S. Dept. Agr. Mktg. Res. Rpt. 188, 1957.

[4] Interstate Commerce Act, as amended, Parts II and III.

[5] Interstate Commerce Act, Amendment to Part II known as Transportation Act of 1958.

Table 3.–Rail freight tonnage and indexes of farm output and industrial production

Year	Farm product traffic[1]		Farm output index[2]	All carload traffic except farm products[3]		Industrial production index[4]
	Actual	Index		Actual	Index	
	Million tons	*1947 = 100*	*1947 = 100*	*Million tons*	*1947 = 100*	*1947 = 100*
1947	177.9	100	100	1,337.1	100	100
1948	162.0	91	109	1,326.6	99	104
1949	155.7	88	107	1,058.2	79	99
1950	143.5	81	106	1,199.8	90	114
1951	155.2	87	110	1,311.9	98	124
1952	153.0	86	114	1,220.1	91	128
1953	144.9	81	115	1,231.1	92	139
1954	144.9	81	115	1,072.1	80	131
1955	147.0	83	119	1,242.4	93	147
1956	151.3	85	120	1,289.6	96	153
1957	148.7	84	117	1,226.2	92	154
1958	156.6	88	126	1,029.3	77	142
1959	155.5	87	127	1,072.8	80	161
1960	159.8	90	131	1,077.6	81	166
1961	163.2	92	132	1,028.0	77	167
1962	164.7	92	133	1,066.7	80	180
1963	170.0	96	138	1,113.2	83	189
1964	169.8	95	[5] 137	1,183.3	88	201
1965	N.A.	N.A.	N.A.	N.A.	N.A.	[5] 218

N.A. = Not available.

[1] Freight Commodity Statistics, Bureau of Transport Economics and Statistics, ICC. Does not include manufactured and canned items.

[2] Gross production of livestock and crops.

[3] Freight Commodity Statistics, Bureau of Transport Economics and Statistics, ICC. Includes all carload freight traffic except categories entitled "Products of Agriculture" and "Animals and Animal Products."

[4] Federal Reserve Board. Index of Quantity Output.

[5] Preliminary.

totals are not compiled for the full amount spent in moving farm products of all types, but of total civilian food expenditures in the United States (an estimated $85.5 billion in 1967), about one-third was paid for the raw value of production at the farm. The remainder was absorbed in processing, packaging, and distributing food supplies. Transportation charges regularly account for 10 percent of the marketing bill.[6] In addition to this revenue, carriers handle farm output for export, for animal feed, and for industrial and military uses. Estimates are not available for these categories of traffic, but they would add greatly to the total. Whatever special problems may be posed, carriers cannot ignore transportation business on this scale.

Moreover, certain features of agricultural products traffic make it exceptionally attractive to carriers who have sharp reductions in industrial traffic volume during business recessions. Although farm output in the different geographic areas varies yearly with climatic conditions, it is much more stable over time than industrial output. Agricultural traffic often fluctuates inversely with general business. For example, during the moderate business recession in 1958, the index of industrial production fell 12 points from the previous year, and rail carload traffic (excluding farm products) dropped even more sharply; farm product traffic, on the other hand, rose 4 points (table 3).

Man's need for food accounts in part for the relative stability of agricultural production during business fluctuations; continuity of demand is largely assured. On the supply side, farming remains in the

[6] The Marketing Bill for Farm Food Products, Marketing and Transportation Situation. Published quarterly by U.S. Department of Agriculture.

class of small business to a substantial degree, and this means that—regardless of market conditions—each farm operator tries to maximize his income by producing all he can. Unlike some manufacturing industries, where a few large producers may account for much of the total output, individual farmers have little or no incentive to cut back their production in the face of falling prices. To do so would result neither in higher prices at market nor in an appreciable reduction of costs. Much of the small operator's input is his own labor, which he either uses or wastes through disuse. Many other costs are fixed, and this may strongly motivate a farmer to produce more when prices are low than when they are high. It takes more bushels of wheat or pounds of beef to pay his taxes, interest on the mortgage, and other expenses when prices fall.

Capabilities of Rival Carrier Types

Railroads

Historically, railroads have constituted the backbone of the Nation's transportation system. For many years they provided the bulk of intercity transport for freight movements of every type and, until recently, handled almost all hauls over distances greater than a few hundred miles. Exceptions occurred where shippers, especially those with bulky commodities, were located directly adjacent to waterways. Development of commercial agricultural production in many areas geographically remote from major population centers depended on such a nationwide transportation network, and conversely, farm traffic has always been important to rail carriers. Farm products often are bulky and move in great volume over long distances.

The relative stability of farm traffic over the course of the business cycle is of particular value to rail carriers because of their own cost structure: Overhead costs represent a relatively high proportion of their total expenses. For them, more than other carriers, a shrinkage of traffic volume produces excess roadbed and terminal capacity and underused equipment; shrinkage decreases operating efficiency and sharply raises average total unit costs. Any sizable component of their traffic which tends to maintain its volume during business recessions reduces their vulnerability to sharply reduced profits or outright operating losses.

Moreover, the increasing necessity for railroads to compete with trucks and barges which operate over improved and expanding systems of highways and waterways has raised the relative importance to them of agricultural traffic. As table 4 shows, over 13 percent of aggregate rail carload tonnage in 1961 was made up of 12 semiperishable and processed classes of farm products—up from 9 percent a decade earlier. As noted in table 4, data for later years are not aggregated in a manner which permits comparison over time. Substantial additional tonnage is derived from perishables. When measured by revenue instead of tonnage, these two classes of commodities together constitute an even larger share of total railroad business and contribute importantly to rail profits. Table 5 shows that the revenue railroads derive from agricultural traffic usually covers the fully distributed cost of hauling this freight as calculated by the Interstate Commerce Commission (ICC).[6a] These computations include return on investment and also an allocated share in meeting the cost of loss-producing portions of rail operations—principally the deficit attributable to passenger service.[6b] Railroads are often better off hauling traffic at rates lower than those calculated in this fashion than by foregoing additional business.

Compared with railroads, the role of trucks and barges in hauling farm products is circumscribed to some extent: for trucks, by relatively high cost per ton-mile, and for barges, by the fixed locations of waterways. But in many areas and for many shipments, these limitations are offset by compensatory advantages or by combined service which utilizes both truck and barge transport for different portions of a single haul.

Highway transport

About one out of every three trucks in this country is engaged in hauling farm-related items. Although only about 7 percent of the total U.S.

[6a] Fully distributed costs include, in addition to out-of-pocket (variable) costs, revenue needs necessary to permit carriers to cover freight operating expenses, rents, and taxes, the passenger-train and less-than-carload operating deficits, and a return of 4 percent after Federal income taxes on the property as a whole.

[6b] Out-of-pocket costs reflect costs which over the long run have been found to be variable with traffic changes at the average density of traffic.

Table 4.–Rail traffic volume of 12 semiperishable and processed classes of farm products, selected years

Farm products	1950	1955	1960	1961	1964
	Million tons				
Wheat	30.5	33.2	40.4	43.2	41.7
Corn	17.6	19.8	21.6	25.1	25.2
Animal and poultry feed	15.8	17.2	15.8	16.0	[1] N.A.
Food products in cans and packages, not frozen	10.2	11.1	12.5	13.2	[1] N.A.
Sugar beets	7.8	7.4	10.0	10.3	14.7
Wheat flour	9.1	9.0	10.1	10.2	10.2
Soybeans	5.4	7.5	8.9	8.7	10.8
Soybean grains	4.5	3.8	9.6	7.3	[1] N.A.
Soybean oil, cake, and meal	3.7	4.3	6.1	6.3	[1] N.A.
Mill products, cereal, etc	6.7	5.7	5.9	5.9	[1] N.A.
Barley and rye	5.2	6.9	6.5	5.9	6.1
Cotton in bales	4.7	3.8	4.2	4.1	4.4
Total	121.2	129.7	151.5	156.0	[1] N.A.
Total carload traffic	1,343.3	1,389.3	1,237.4	1,191.2	1,353.1
	Percent				
Volume of 12 products as a percentage of total carload traffic	9.0	9.3	12.2	13.1	[1] N.A.

[1] Comparable statistics are not available due to changes in method of aggregating data.

Source: Freight Commodity Statistics, Class I Railroads in the United States, Bureau of Transport Economics and Statistics, Interstate Commerce Commission, for the years shown.

Table 5.–Relation of rail freight revenues to fully distributed costs to out-of-pocket costs, 1961

Commodity group	Costs	
	Fully distributed[1]	Out-of-pocket[2]
Products of agriculture	95	118
Animals and products	100	111
Products of mines	80	106
Products of forests	92	117
Manufactured and miscellaneous	123	148

[1] Fully distributed costs include, in addition to out-of-pocket (variable) costs, the revenue needed to cover freight operating expenses, rents, and taxes, the passenger-train and less-than-carload operating deficits and a return of 4 percent after Federal income taxes on the property as a whole.

[2] Out-of-pocket costs reflect costs which over the long run have been found to be variable with traffic changes, at the average density of traffic.

Source: Interstate Commerce Commission. These are the latest figures available for fully distributed costs.

population lives on farms, farm trucks in 1963 numbered nearly 3.7 million out of the 12.6 million total (tables 6 and 7.)[6c] Most of these units were relatively small.

Three types of truckers engage in hauling agricultural commodities: regulated carriers—those licensed to haul regulated (mostly nonagricultural) commodities over assigned routes and subject to prescribed conditions; for-hire carriers who specialize in the business of hauling exempt (farm product) commodities; and "private" carriers—those not engaged primarily in the business of transportation who own trucks for their own convenience. Many of these are farm-owned trucks or are operated by those engaged in closely related business activities. Other private carriers sometimes haul farm products to avoid empty movements in one direction. This capacity can be an important supplement to the available supply of equipment—particularly during harvest season when demand for service exceeds supply.

For regulated motor carriers, the movement of unmanufactured farm products represents only a small portion of their business—2 percent or less in terms of their tonnage for 1960-63 (table 8). Regulated carriers, many of whom operate large trucking fleets, specialize in hauling manufactured goods (including some processed farm products) at rates set by public authorities. Although they are also permitted to haul unmanufactured farm products traffic without restriction on their charges or areas of operation, such traffic does not ordinarily coincide closely with nonfarm traffic, so regulated carriers do not usually seek it. There are notable exceptions in local areas and for some perishables during the peak of the harvest season.

Much of the intercity highway movement of farm products is carried out by truckers engaged exclusively in this business, and the characteristics of these firms reveal much about the special advantages and limitations which truckers possess in competing for this traffic with other modes of transportation.[7] They are mostly small operators with one to five over-the-road units, and their trucks probably constitute less than 5 percent of all for-hire trucks in the United States. They are located throughout the country, distributed according to the crops produced in an area or in adjacent regions. Although they concentrate their efforts in one area, they can shift their operations freely to serve seasonal harvest peaks. In short, they are flexible.

The heavy inroads made by trucks into the business of hauling farm traffic that used to move mostly by railroad were made possible mainly by this flexibility—in terms of both physical mobility and of adaptability to the shipper's quantity needs. This advantage is partly inherent in a trucker's geographic mobility. It is also partly due to freedom from regulatory restraint. With no territorial restrictions, a trucker can haul a load of unmanufactured farm products from any origin to any destination. He does not need to share responsibility or coordinate his equipment with anyone.[8] He can agree to haul one truckload or a dozen (if he has that much equipment) and to start at once. The trucker is ready to move as soon as he has a load. In contrast to the trucker's flexibility, railroads usually accumulate 70 carloads or so in a train before the train is moved. Once the trucker starts, he may go to a freeway where he can travel for several hours without interruption at speeds of 50 or 60 miles per hour over highways with grades comparable to those of the railroad and usually over a much straighter route. Compared with his rail competitor, the trucker can provide fast, direct, and schedule-keeping service from first origin to final destination—but at a relatively high cost.

For long hauls, trucks are less likely to have an advantage (Ch. 6 and 8). Where traffic is available in sufficient volume to make efficient rail operations possible, the cost per ton-mile of moving commodities by rail remains significantly lower than that for truck service, especially where substantial distances are involved. As a practical matter, however, highway carriers often find this operating disadvantage less significant than would appear. Rail cars often move very circuitously across the country. This was beneficial to the railroads and to shippers when they were the only carriers, because it provided more traffic for the carrier while making long-haul transportation available to producers who would otherwise have been entirely without it. Today, however, higher

---

[6c] Farm truck detail is available only for 1963.

[7] Mildred R. DeWolfe. For-Hire Motor Carriers Hauling Exempt Agricultural Commodities—Nature and Extent of Operations. U.S. Dept. Agr. Mktg. Res. Rpt. 585. 1963.

[8] Walter Miklius. Comparison of For-Hire Motor Carriers Operating Under the Agricultural Exemption with Regulated Carriers. U.S. Dept. Agr. Mktg. Res. Rpt. 769. 1966.

Table 6.--Distribution of farm trucks: region and type

Region	Pickup	Platform and cattle rack	All body types[1]
	Number		
North Atlantic	119,476	87,893	244,397
East North Central	372,004	186,924	580,620
West North Central	501,180	324,605	848,886
South Atlantic	322,639	103,464	449,213
South Central	757,278	219,539	1,000,243
West	312,900	219,278	552,426
Total	2,382,477	1,141,703	3,675,785

[1] Includes van, refrigerator, tank, dump, panel, and other.

Source: U.S. Bureau of Census, 1963 Census of Transportation, Truck Inventory and Use Survey.

Table 7.--Private and for-hire trucks, by type, 1963 and 1966

Type of truck	Private		For-hire	
	Number	*Percent of total*	*Number*	*Percent of total*
1963				
Single unit trucks:				
2 axles	11,012,836	95.2	628,818	61.0
3 axles	163,127	1.4	44,422	4.3
Total	11,175,963	96.6	673,240	65.3
Combinations:				
3 axles	177,011	1.5	121,826	11.8
4 axles	168,912	1.5	168,929	16.4
5 axles (or more)	47,434	.4	66,685	6.5
Total	393,357	3.4	357,440	34.7
Grand total	11,569,320	100.0	1,030,680	100.0
1966				
Single unit trucks:				
2 axles	12,585,171	94.6	791,680	56.8
3 axles	200,905	1.5	56,080	4.0
Total	12,786,076	96.1	847,760	60.8
Combinations:				
3 axles	191,592	1.4	142,014	10.2
4 axles	252,794	1.9	279,982	20.0
5 axles (or more)	74,508	.6	125,274	9.0
Total	518,894	3.9	547,270	39.2
Grand total	13,304,970	100.0	1,395,030	100.0

Source: Third Progress Report of the Highway Cost Allocation Study, and Supplementary Reports, Bureau of Public Roads, U.S. Department of Commerce.

Table 8.–Volume of 12 farm products moved by class I regulated motor carries of freight, 1960-63

Farm products	1960	1961	1962	1963
	1,000 tons			
Wheat	373.2	320.9	329.3	287.7
Tobacco	140.2	133.5	129.2	139.0
Cotton in bales	337.4	298.5	293.3	246.9
Oranges and grapefruit	153.5	141.7	171.0	159.6
Peaches, fresh	207.2	223.1	214.8	219.6
Fresh fruits and berries (not frozen)	472.7	465.9	493.9	489.6
Potatoes	209.3	206.9	220.9	213.2
Tomatoes	294.7	269.7	303.0	251.6
Vegetables, fresh (exc. tomatoes)	343.2	341.5	395.0	405.4
Sugar beets	186.5	227.6	212.4	189.4
Poultry, dressed and frozen	210.5	207.0	227.7	180.3
Cattle and calves	239.3	230.2	216.4	201.7
Total	3,167.7	3,066.5	3,206.9	2,984.0
Total truckload traffic of all kinds including canned and manufactured farm products	168,328.9	171,554.6	185,571.6	195,111.0
	Percent			
Volume of above 12 large-volume farm products as a percentage of total truckload traffic	1.9	1.8	1.7	1.5

Source: Motor Carrier Freight Commodity Statistics, Class I Common and Contract Carriers of Property. Bureau of Transport Economics and Statistics, Interstate Commerce Commission.

Table 9.–Rail and truck mileages from Montana points to Pacific Coast ports

From–	To–					
	Portland, Oreg.			Seattle, Wash.		
	Rail	Truck	Ratio of rail to truck	Rail	Truck	Ratio of rail to truck
	Miles	*Miles*	*Percent*	*Miles*	*Miles*	*Percent*
Glasgow, Mont.	1,196	1,006	119	1,014	935	108
Bozeman, Mont.	1,005	782	129	866	711	122
Great Falls, Mont.	1,038	732	142	856	661	130
Havre, Mont.	1,043	845	123	861	774	111

mileages sharply reduce the cost advantage railroads possess over highway transport. As an example, railroad distances from Montana grain producing points to Portland and Seattle are as much as 30 to 40 percent greater than highway distances (table 9).

Other exceptions to the long-haul cost advantage enjoyed by rail carriers grow out of unbalanced geographic patterns in the production and marketing of agricultural products. The rates truckers will offer to attract freight for particular hauls generally depend on the amount and profitablity of traffic available to them for other portions of the same round trip. For some traffic, such as northbound movements of fresh fruits and vegetables along the east coast, one-way hauls are sufficiently profitable to create truck movements regardless of traffic available in the other direction. Where such movements occur, operators are willing–if necessary–to carry cargo over other legs of the same route at much lower rates rather than travel empty.

Reduced charges offered under these circumstances are usually called "backhaul" rates, regardless of the particular segment of the round trip to which they are applied. For-hire truckers compete with other carriers or each other for particular traffic so long as total revenues from all portions of a round

trip cover total cost, including an adequate profit.[9] Private carriers may also haul farm products at low rates on a route over which their equipment would otherwise travel empty (Ch. 8 and 9).

Barge carriers

Barges are the third major carrier type competing for agricultural traffic. Even more than railroads, they are bulk carriers. Large volumes of freight must be accumulated and the service they offer is slow, compared with either trucks or railroads. Furthermore, their routes are fixed geographically by the navigable waterways. The areas they serve, however, have expanded notably in recent years as the inland waterway system has been extended and improved—a process which is still going on.

To offset their limitations, barges have important cost advantages. Where sufficient traffic is available and where rapid delivery is not essential, barges offer shippers a low-cost transportation alternative. Barges can meet the needs of many shippers of less perishable farm products, especially to a number of ports. Grains constitute a very important commodity by volume for all barges operating on inland waterways.

Combination service

Barge operators have been broadening their ability to attract shippers of processed items (such as flour, livestock, feed, and fertilizers) and expanding their limited geographic range by coordinating service with other carriers. The overland portion of combination hauls can be either by truck or by rail, but it has been principally through coordination of truck and barge service that the geographic areas of barge operation have expanded. Any traffic railroads share with barges is traffic that might otherwise have moved entirely by rail; when faced with competition, the rail carrier usually tries to retail such traffic from origin to destination, offering rate cuts if necessary. In some instances, railroads have attempted to acquire barge equipment to supplement their own service, but present laws and restraints by regulatory authorities have mostly discouraged this. Consequently, coordinated rail-barge service usually is provided only to the extent that public authorities have brought pressure on the railroads to do so.

The very low operating cost of barges offsets use of higher cost service at origin or destination end of the haul and also the expense of transferring freight between trucks or railcars and barges. Exactly how much traffic now moves by a combination of truck-barge, rail-barge, or the alternative combination of truck-rail hauls in various areas of the country is not known. Growth in the numbers of trucks and barges, improvements and extensions in the Nation's highway and waterway system, and greatly improved facilities for loading and unloading at points of transshipment (including use of containers) have all been factors in increasing the total. Farm products, particularly grain, now move to waterways from points 100 miles or more inland, while in other instances, trucks carry products from waterway unloading points to destinations many miles distant.

The geographic range of barge-truck combination service radiates out from the waterway system, and its periphery at any time is where equivalent service is available at about the same cost by either rail or joint haul. Over time, this periphery is being extended to include points increasingly far inland, and the effectiveness of the competition which results is attested by a progressive series of rail rate reductions in affected areas. Combination hauls extend the advantages of transportation alternatives to many shippers not actually located on waterways and yet too far from major markets to find truck costs for through hauls competitive. While savings have naturally been greatest for shippers located closer to waterways, producers at much greater distances may also benefit not only from at least a limited reduction in rates but also by gaining access to a larger number of markets for their output.

Still other producers, however, remain beyond the geographic limits of joint service, and for those along its outer boundary, the financial savings of such service may be slight. Thus, the benefits of recent technological improvements in transportation and of the increasing competition among carrier types which these have made possible do not become equally or simultaneously available to all shippers. Since many of those shippers formerly utilized transportation services on equal terms, producers who are not so located as to benefit now from recent developments may actually be hurt. Even though their shipping charges do not increase, they may find themselves at

[9] Walter Miklius. Some Characteristics of Nonregulated For-Hire Truck Transportation of Agricultural Commodities. Land Econ. 42: 226-230. May 1966.

a disadvantage in many markets—compared with those of their competitors who, by reason of a more favorable location are benefiting from lower charges. Developments which clearly increase transportation flexibility, lower the cost of marketing farm products, and improve the quality of transportation service may also, at least in the short run, seriously disrupt existing producing, processing, and marketing patterns.

Air transport

A fourth carrier type—air transport—also has a growing stake in the movement of agricultural products, but it is not at present a significant competitive factor in terms of total traffic. Air movements of farm products are growing rapidly, however, and constitute an important potential source of revenue for the airlines.

Cut flowers, fresh fruits and vegetables, and seafood are the chief items shipped by air now. There are distinct advantages to shipping perishables by air, despite the fact that air freight rates are 50 percent or more above railway express and several times as high as rail freight. Transit times are much shorter; packaging for air freight is less expensive; spoilage is notably less. Tree-ripened fruit and vine-ripened vegetables can be delivered to gourmet markets for premium prices.

The total amount of air freight originating on farms has already grown sufficiently to motivate research by air carriers into the traffic potential and is directing increased attention to the problem of aircraft design for freight movements, even over relatively short distances. In the overall spectrum of service choices, air transport can provide speed in delivering products where these warrant paying the cost. As equipment is modified and adapted to the needs of agricultural shippers, more such service will undoubtedly be utilized, and this prospect has important implications for future needs in storing, packaging, and delivering farm products to the consumer.

CHAPTER 2.—THE BACKGROUND OF UNEQUAL REGULATION

Within the past decade, Federal transportation policies have been continually scrutinized, largely as a result of adverse operating trends experienced by the Nation's railroads. Since World War II, many rail carriers have suffered chronic financial difficulties. During recessions, financial problems have been serious for all and critical for some. Rail earnings were severely affected during the relative moderate recession in 1958; this caused a general re-examination of regulatory policies. That review resulted in a few legislative and regulatory changes, but many of the questions raised by carriers, shippers, and policymakers are still unresolved. Among these are the unequal regulatory status of railroads, trucks, and barges when they compete for traffic of certain types, including unprocessed farm products, and the contention by many rail carriers that they are unfairly handicapped by this disparity.

Traffic Trends Among Carrier Types

Lower rail earnings in recent years have not been due to an outright decrease in the aggregate amount of freight moving by rail. Despite wide cyclic fluctuations in traffic volume, total ton-miles of rail freight rose (table 10) from 379 billion ton-miles in 1940 to a record of more than 700 billion in 1965—about an 80-percent increase. But this gain falls short of matching either the growth rate of the whole economy over the same period or the expansion in total freight volume generated by that growth. The rapid increase in total transportation requirements has masked heavy losses of traffic by the railroads to other carriers and a steep decline in their relative position.

Rates of expansion for other modes of transportation have been much greater than for rail carriers. Trucks, which hauled only 62 billion ton-miles of intercity freight in 1940, hauled 371 billion in 1965—more than a sixfold increase; as a result, their share of total intercity traffic rose from 10 percent to more than 22 percent. Pipelines increased their share from 10 to 19 percent. Inland waterway traffic declined somewhat in relative importance, although its prewar volume more than doubled. Rail carriers

Table 10.–Distribution of intercity freight ton-miles, by types of carriers, selected years

Year	Railroads	Motortrucks	Inland waterways	Oil pipelines	Airways	Total
	Billion ton-miles					
1940	379.2	62.0	118.1	59.3	–	618.6
1945	690.8	66.9	142.7	126.5	–	1,027.1
1950	596.9	172.9	163.3	129.2	–	1,062.6
1955	631.4	223.3	216.5	203.2	–	1,274.9
1960	579.1	297.7	220.3	228.6	–	1,326.4
1965	708.7	370.8	256.0	310.1	1.9	1,647.5
	Percentage of annual totals					
1940	61.3	10.0	19.1	9.6	–	100.0
1945	67.3	6.5	13.9	12.3	–	100.0
1950	56.2	16.3	15.4	12.2	–	100.0
1955	49.5	17.5	17.0	15.9	–	100.0
1960	43.7	22.4	16.6	17.2	–	100.0
1965	43.1	22.4	15.6	18.8	.1	100.0

Percentages do not always add due to rounding.

Source: Annual Reports of Interstate Commerce Commission.

were the principal losers, however, with their share in total traffic falling from 61 to 43 percent.

The relatively greater freedom of other carriers to compete for shipments of unprocessed farm products contributed to the shift in traffic from the railroads. The extent for which it is responsible for this adverse trend cannot be determined, since many other forces have also been at work. Technological progress has increased the ability of trucks, barges, air carriers, or combinations of these to offer types of service which have inherent advantages, either in cost or quality, for shipments of many types. Moreover, rail carriers themselves have often adopted policies which tended to aggravate their problems. For much of the postwar period they attempted to compensate for declining revenue by seeking general rate increases.

The relative importance of regulated and unregulated traffic among the various modes of transportation is shown in table 11. All freight tonnage shipped by rail is moving at rates and on terms subject to Federal or State regulation or both. ICC estimates made in 1964, however, indicate that nearly two-thirds of all intercity freight tonnage moving by highway and almost 90 percent of that by waterway is not subject to Federal regulations other than those associated with factors related to safety.

Truck and barge operators who provide transportation service on a for-hire basis can compete more freely than rail carriers for only a limited range of commodities. But railroads (like all for-hire carriers) increasingly "compete" with many of their own shippers. Anyone may use public highways and waterways to move his own property in his own equipment, and recent progress in transportation technology has made it feasible and expedient for many large shippers to do so. Moreover, the possibility that others may chose to acquire such

Table 11.–Federally regulated and non-Federally regulated intercity freight ton-miles by kind of carriers, 1964

Carrier	Federally regulated	Not federally regulated	Total
	Percent		
Rail	[1] 100.0	[1] 0.0	[1] 100
Highway	35.8	64.2	100
Waterway	11.5	88.5	100
Pipeline (oil)	85.4	14.6	100
Air	100.0	0.0	100
Total	60.8	39.2	100

[1] Rates on intrastate traffic are regulated by some States, but the ICC reviews these rates to determine that they are compensatory.

Source: Eightieth Annual Report of Interstate Commerce Commission.

equipment in the future constitutes a highly effective form of potential "competition." The impact of unregulated shipments on rail revenues and freight volume thus extends well beyond the clearly definable segment of traffic that includes unprocessed farm products.

Over half of all large trucks—combinations with three or more axles—are owned by those principally engaged in business other than transportation. The comparable figure for barges, as shown by a 1956 study, was only 33 percent, but another 44 percent were owned by carriers who used them in moving exempt commodities. Large rail shippers sometimes own their own freight cars—especially where the goods shipped require specially constructed equipment, but this is not analogous to ownership of highway and waterway equipment; these cars move over the railroad's line at regulated rates as part of the carrier's own traffic. Such shippers do, however, receive allowances from the road for furnishing equipment.[10]

For all these reasons, it is important not to overemphasize the significance of specific differences in regulatory treatment among carrier types. But there can be no question that, for classes of traffic where these differences exist, railroads have been handicapped in their ability to respond promptly enough to inroads in their freight volume by carriers who enjoy greater competitive freedom. Only recently has ICC acceptance of rate cuts, clearly necessitated by direct competition, become routine, and the range within which such concessions usually are not challenged remains quite limited. Rail ability to take the initiative in improving its traffic share is even more limited. Although this competitive handicap cannot be quantified, existing disparities in regulation seem to be considered significant by many railroads, especially those serving predominantly agricultural producing areas.

The Regulatory Status of Carrier Types

The differences in regulatory treatment among carriers and commodities moving in interstate commerce have already been indicated in general terms. Before discussing them more precisely it should be noted that the term "unregulated" does not imply freedom from controls intended primarily to assure a reasonable degree of safety for persons or property or to prevent abuse of rights-of-way used. All traffic is subject to regulation in this sense, and such controls have economic implications for all carriers. However, interstate traffic is usually referred to as "unregulated" if no Federal Government agency has jurisdiction over the charges for-hire carriers can make for their services or over the routes and shippers they can serve.

This traffic constitutes a particularly competitive sector of the for-hire transportation business, because market forces rather than a public agency are relied on to regulate rates and services in the best interests of shippers, carriers, and the consuming public. Also included in the unregulated category is traffic which businesses not primarily engaged in transportation activities move in their own equipment for their own convenience. Owners of this equipment may sometimes use it to haul freight for others on a for-hire basis, but when they do so they can bid only for unregulated commodities. Alternatively, where their equipment would otherwise be moving empty, owners may lease it to a regulated carrier and in this case regulated commodities may be hauled. The contract would be with the carrier rather than the shipper, however.

Table 12 gives a schematic view of the kinds of for-hire traffic that are regulated and those that are not. Like all other commodities, unmanufactured farm products are subject to regulation by the ICC when they move interstate by rail. But providing certain conditions are met, they can generally move in interstate commerce by either highway or waterway at rates and subject to terms determined competitively among carriers and shippers.

In the case of highway transport, freedom from regulation was established by an explicit exemption of such products from the regulatory provision of the Motor Carrier Act of 1935.[11] When this Act brought most motor carriers under regulation, vehicles used in the for-hire hauling of livestock, fish (including shellfish), or agricultural commodities (not including manufactured farm products) were explicitly excluded from these requirements so long as the same truck was not used at the same time in carrying any regulated commodity for compensation.

[10] Hearings of a Subcommittee of the Committee on Interstate and Foreign Commerce, House of Representatives, 84th Cong., 2d Sess., Transportation Policy, p. 1513.

[11] For precise wording of the law, see Interstate Commerce Act (as amended), Part II, Section 203.

Table 12.–Regulatory status of interstate for-hire freight of farm-originated products

Selected farm products	Railroads		Highways		Waterways	
	Manufactured	Unmanufactured	Manufactured	Unmanufactured	Packaged	Bulk
Grain	Yes	Yes	Yes	No	Yes	No
Vegetables (fresh)	Yes	Yes	Yes	No	Yes	No
Vegetables (frozen)	Yes	Yes	Yes	Yes	Yes	Yes
Cottonseed meal	Yes	Yes	Yes	Yes	Yes	No
Poultry (fresh)	Yes	Yes	No	No	–	–
Poultry (frozen)	Yes	Yes	No	No	–	–
Cheese	Yes	Yes	Yes	Yes	Yes	Yes
Butter	Yes	Yes	Yes	Yes	Yes	Yes

While unmanufactured farm products moving by highway are usually hauled by carriers specializing in this business, all motor carriers–including those with ICC certificates to haul specified regulated commodities over specified routes–are free to bargain independently for this traffic. The criterion is the character of the product hauled, and the sole restriction is that "regulated" traffic may not be hauled in the same truck at the same time.

In the same act, motor vehicles under the control of a farmer were also specifically excluded from regulatory control when used in the transportation of his own produce–and products thereof–or of his supplies. This provision includes vehicles controlled by a cooperative as defined in the Agricultural Marketing Act, and used in hauling items related to the cooperative's members. Farmers do not differ in this respect from other owners of trucks who wish to haul their own traffic so long as the owner's primary business is not transportation. Specific reference to farm-based trucks in the Act, however, served to underscore the intent of Congress that farmers be free to haul their own products and supplies with virtually no restraints.

While the destinction between manufactured and unmanufactured farm products is clear in theory, it has not been in practice. From the passage of the Motor Carrier Act in 1935 until 1958, classifications were subject to a variety of changes, not only through modifications of Federal law, but also through changing interpretations by the regulatory authorities and–in cases where the ICC classifications were challenged–through court decisions. When the Interstate Commerce Act was amended in 1958, Congress identified more clearly the limits of the competitive sector of agricultural truck transport by explicitly incorporating into the law the list of products that the Interstate Commerce Commission had prepared for the use of its staff in determining whether specific products were or were not in the competitive area. At the same time, Congress itself made several changes of classification. Among the most significant of these was the decision that frozen fruits, berries, and vegetables should be subject to regulation.

For waterway carriers, the dividing line between regulated and competitive traffic depends not on the degree of processing that products have undergone before shipment, but on the way in which they are shipped. Generally speaking, the Transportation Act of 1940[12] brought under the economic jurisdiction of the Interstate Commerce Commission interstate movement of packaged commodities on intercoastal and inland waterways. Shipments to foreign destinations, including shipments of farm products, constitute a special case since rates are only partly subject to Federal regulation, and are not within the focus of this study. All items which were customarily shipped in bulk–that is, unpackaged, unmarked, and uncounted–at the time the Act was proposed were left unregulated, and this basic test still applies.

Items that moved in bulk prior to a cutoff date of June 1, 1939 (shortly before the legislation was introduced), were not and are not now subject to regulation, so long as a cargo space in the same vessel or tow is not being used to carry more than three such bulk items or to carry regulated traffic at the same time. Unlike motor carrier legislation, this "bulk shipment" provision does not specifically single out traffic in unprocessed farm products. It covers such

[12] For precise wording of the law on this subject, see Interstate Commerce Act (as amended), Part III, Section 303.

major components of waterway tonnage as sand, gravel, and items of that nature. But most of the farm products which were actually moving by waterway at the time the Act was passed came within the scope of its coverage. Of these, grain shipments remain the most important single category.

Another provision of the Act specified that shipments of liquid cargoes in tank vessels or tows shall be free from regulatory restraint, and since this provision was not limited to products which moved in bulk prior to 1939, its importance is likely to grow in the future. Tank shipments include not only oils of farm products, but also petroleum products which constitute an important element in farm production costs.

Although specific provisions applicable to highway and waterway transport thus differ substantially, the general effect of both is to permit these modes to compete freely for most traffic in unmanufactured farm products. (In both cases, of course, owners of highway or waterway equipment are also free to move their own traffic.) Thus, despite differing statutory provisions, highway and waterway carriers in practice enjoy equivalent freedom in competing for the interstate movement of farm output whereas the rates and other terms offered by railroads—their major competitor for this traffic—can be set or changed only by regulation. This regulatory treatment and the handicap it imposes on rail carriers in competing for farm traffic have come under increasing study in recent years. But no consensus has developed as to the extent or even the appropriate direction of future changes in regulatory policy.[13]

The railroads themselves advocate substantial or complete relaxation of existing restrictions on their freedom to compete for this traffic. They are supported in this by those who feel that underlying conditions in the transportation industry are now such that shippers, the consuming public, and the economy as a whole would all gain from freer competition. Many specialists in transportation support this contention either in full or to a substantial degree, and the weight of evidence in the present study tends in this direction. Others, however, including many with wide experience in the transportation field, vigorously deny it.

Critics of complete elimination of rate regulation are convinced that, despite the growth in highway and waterway service, greater freedom would permit the railroads to reestablish their predominance as freight carriers for much traffic (particularly long-haul traffic) and with it the highly unsatisfactory conditions that led to regulation in the first place.

Still a third point of view is represented by those who believe that transportation rates reached through competitive market pricing are less desirable for agriculture and related industries than those established by regulatory authorities. Such critics are anxious to maintain or restore traditional rate relationships by extending uniform regulatory requirements to shipments and carriers not now covered by them.

Any assessment of these contradictory viewpoints and the controversy they have engendered requires some understanding of the historical circumstances which led to present regulatory patterns and of the ratemaking procedures which developed under regulations.

Background of Regulation

The events leading to virtually complete Federal regulation of the railroad industry have been chronicled frequently.[14] Only the more relevant highlights need to be reviewed here. Growth of the Nation's railroad system was, of course, a development of enormous importance and great benefit, especially to agriculture, since it opened to production wide areas from which it had previously not been physically or economically feasible to reach major marketing centers. Throughout the mid-19th century, State and Federal Government—as well as local farmers and businessmen—encouraged rail growth,

[13] For advocacy of less regulation see President Kennedy's message to Congress on the Nation's transportation problems, April 5, 1962: The Transportation System of Our Nation. For arguments for greater regulation of the transportation industry see: Report Prepared for the Committee on Interstate and Foreign Commerce, U.S. Senate, by Special Studies Group on Transportation Policies in the United States: National Transportaion Policy, pursuant to S. Res. 29, 151 and 244 of the 86th Cong., Jan. 3, 1961, pp. 130-138 and 516-533; George Wilson. The Effect of Rate Regulation on Resource Allocation in Transportation. Amer. Econ. Rev. LIV(5): 160-197. May 1964; Maurice P. Arth. Federal Transport Regulatory Policy. Amer. Econ. Rev. LII(2):416-425. May 1962; Walter Adams. The Role of Competition in the Regulated Industries. Amer. Econ. Rev. XLVIII(2): 527-543. May 1958; and others.

[14] For a good history, see D. Philip Locklin. Economics of Transportation. Ed. 6, ch. 10-13. Irwin. 1966.

not only by providing a favorable economic environment but also with major financial assistance, sometimes in the form of gifts of land and money and sometimes in the form of broad charter rights and tax advantages. Expansion was very rapid and perhaps too much capacity was created.

Once a rail system had come into existence, however, many groups contended that the market forces of competition could not be relied on to insure satisfactory rates and services. Individual shippers might be confronted with either of two opposing situations. Where both origin and destination of a shipment were served by two or more roads, fierce competition often developed. On the other hand shipments originating or terminating at some intermediate point along a single road's right-of-way were captive to that carrier.

Where highly competitive conditions existed, railroads fought for traffic by offering noncompensatory rates. On the other hand captive traffic could be charged all the shipper would pay to avoid leaving his crops in the field. And such high rates were often used, in part, to make up losses incurred in moving competitive traffic at far less than average total cost. This resulted in rate differentials which did not reflect differences in the cost to the carrier of moving particular shipments and often produced a perverse pattern of rate relationships which might be related inversely to the physical cost (measured in terms of resources used) of moving two loads of freight. Shippers located long distances from markets could often use either of two railroads with equal convenience and so found both bidding for their traffic, whereas intermediate and short-haul traffic was often captive to one carrier. The result was that products requiring long hauls frequently moved for no more or even less than those going shorter distances.

The treatment of shippers located in competitive and monopoly areas (as well as other highly publicized abuses by some railroads) was an important motivating force in the Granger movement, which developed during the latter part of the 19th century. Through this organization, farmers—mostly in the West—sought legislative redress for economic grievances, including those against the railroads.[15]

They applied pressure first to State legislatures, and some of these passed laws fixing the charges railroads could make for intrastate traffic. Others established State regulatory commissions to control rates in accordance with broad guidelines. But this form of redress, in turn, created its own abuses. Some States took advantage of their opportunity to reduce local rates by forcing the railroads to establish intrastate charges that were noncompensatory. The railroads, therefore, made up for deficits on some intrastate traffic by charging more than compensatory rates on interstate shipments. By the 1880's, these inequalities had led to demands for Federal action, and in 1887 Congress passed the Interstate Commerce Act.

As initially formulated, this law required the Interstate Commerce Commission to justify its actions regarding the rates set by the railroads. By initiating court action, railroads were often able to reverse proposed orders or to delay their application until shifting economic conditions made them obsolete. The law was strengthened over time, and by the early 1900's, Federal regulation covering the overwhelming preponderance of all rail freight—both interstate and intrastate—was established. Developments had shown that neither interrail competition nor State regulation could furnish a satisfactory alternative to Federal regulation under the conditions then existing.

Through amendments to the Interstate Commerce Act and interpretations made by the Commission and the courts, Federal control over the railroads was made almost complete. It extended, and still extends, far beyond regulation of charges made and services provided to shippers either separately or through coordination with other railroads. Construction programs, if they involve extension of routes, have to be approved by the ICC. Acquisition of capital beyond nominal sums is subject to regulation. The condition of equipment and trackage is also subject to control. The ownership or operation by the railroads of nonrailway equipment in moving traffic is prohibited by Federal law except when it is to be used in conjunction with rail service and even then is severely restricted. This restriction has had serious implications for the development of multimodal combination service (ch. 4). The extent of control by one railroad over another, whether through ownership, lease, or combination of these is monitored by the ICC. All of these controls affect the ability of the railroads to compete successfully with other carriers.

[15] Locklin, op. cit., ch. 14 and 15.

Ratemaking Under Regulation

During the period of rail dominance, about 1860-1945, regulated rate decisions were the direct determinant of transportation costs for almost all producers in obtaining supplies and getting their output to market. The relative competitive positions of producers, marketers, and processors in differing geographic locations depended to a great extent on the pattern of rate relationships established among shipments traveling to the same markets from different origins or to different markets from the same origin.

Since regulation had been brought into being by charges of monopoly in some areas and irresponsible competition in others, it might be supposed that regulatory authorities would have revised rate structures to conform more closely to the pattern of rates that might have been produced by market pricing under conditions of workable competition. This was not done. Changes approved by regulatory authorities came closer to ratifying the pattern of rate relationships that prevailed when controls were introduced than to substituting the pattern which might have been expected from competitive pricing—that is, to setting rates for each haul which closely reflected the cost to the carrier of providing that particular service.

Instead, for a number of commodities, ratemaking authorities permitted the railroads to establish various group rates covering all origins and destinations within areas of widely differing size. In such regions all producers of a commodity, wherever located, could ship to the major marketing centers for about equal cost. Often they could also ship unequal distances to either of several marketing centers for about equal costs. Where shipping costs were thus equalized, location within the area was, in effect, nearly eliminated as an element in the relative competitive position of producers among themselves and also in that of marketers and processors competing for the same output.

The agricultural segment of the economy was already adjusted to rates that permitted production, particularly that of grain, to become established in areas where it would not otherwise have been economically feasible. Highly organized marketing and processing centers also had developed on considerably wider territories than they could have served if less equalized transportation prices had been in effect. In all stages of agricultural production and distribution, those who would have been hurt by changes stressed the disruptive economic consequences of altering established rate patterns.

Those who preferred group rates also stressed the advantages—both to agriculture and related industries and to the consuming public—of marketing territories large enough to assure competition at all stages of moving agricultural output to the ultimate consumer. This argument had some merit at the time it was presented. It seemed at that time that marketing areas determined by the radius of competitive transportation rates would be too sparsely populated and too narrow geographically to support orderly large-scale marketing and to assure adequate competition among buyers and sellers. By making it possible for more producers to ship farm products to the same market on about equal terms, rate structures established during the period of regulated rail predominance created territories of adequate size to permit organized marketing to develop. And by making it possible for producers to ship to either of several markets on about equal terms, adequate competition among carriers, marketers, processors, and distributors was also assured.

The intention of ICC to permit such arrangements needs to be recognized. The criteria used in setting and justifying commodity group rates, some of which—like the so-called blanket rates for grain—covered very wide areas, were not based solely on the financial status, needs, or capabilities of the carriers providing services. Instead, they reflected judgments concerning the competitive status of the product being shipped and the markets being served. Under the Interstate Commerce Act, the Government's regulation of interstate commerce was important in determining the geographic locations of agricultural production and marketing centers throughout the United States.

Ratemaking practices fostered geographic patterns quite different from those which would have developed had transportation charges paid by shippers in diverse locations generally reflected the cost advantage of hauling produce shorter distances or over less difficult routes. Instead, agricultural producers and marketers concurred in rates which virtually eliminated location as a factor in competition among themselves.

The resulting pattern of rate relationships, developed in response to pressures from patrons, was

acceptable to the carriers so long as total revenue from all traffic produced an acceptable profit. Rates were set to yield aggregate revenues equal to those the carriers might have obtained from a combination of varying rates established on the basis of specific costs for hauling specific traffic.

But a group rate could be depended on to yield the railroad the same aggregate return as rates individually adjusted to actual costs only if the railroads were assured that substantially all the traffic to which the rate applied would move by rail. In other words, traffic from less accessible locations had to be balanced by shipments yielding the carrier a relatively greater profit. So long as railroads remained the primary carrier of most agricultural traffic, this condition was met. It was jeopardized as soon as competition from other carrier types became widespread.

Emergence of Intermodal Competition

Before the mid-1930's, railroads had strong technological advantages over other carrier types. Highways were unsatisfactory for long-distance hauling, and the trucks of those days generally were not suitable or economical for hauling except to the nearest railroad. The use of waterways, even where these were geographically available, was restricted both by their poor condition and by inadequate control of water levels. By the mid-1930's, airlines were just beginning to offer transcontinental passenger service, and air freight was scarcely thought about.

By 1935, when Congress established the broad outline of regulatory policy for highway transportation, the motor carriers were beginning to compete with the railroads, though only in limited areas, for a limited number of commodities, and over limited distances. Five years later, the extension of ICC's jurisdiction to some waterway traffic showed that waterborne carriers also were a significant component in the overall transportation system.

In both instances, the decision to extend regulatory controls to developing modes of transportation was influenced in part by evidence that rail earnings, which were inadequate during the 1930's, were being adversely affected by intermodal competition. But also in both instances, Congress recognized the benefits that farm shippers might gain from the service and bargaining flexibility that improved highway and waterway transportation made possible. As a result, rates charged and services provided for this traffic by carriers of both types were left largely to the regulation of competitive forces in the market. The Interstate Commerce Act has been amended on several occasions since these decisions were made, but the basic distinction between regulated and unregulated traffic has remained unaltered.

Truck or combined truck-barge service to a growing number of shippers has extended the range of effective intermodal competition outward along a widening periphery. Alternatives to rail transport become available first to shippers whose locations are more accessible to marketing centers. Even when service areas expand to include those at greater distances, bidding among competitors forces rates downward more sharply for traffic which can be handled at less cost, so that shippers of short and intermediate traffic generally have wider and more attractive alternatives to rail transport than do producers who must ship long distances or to less readily accessible markets.

For commodities and in areas where group or territorial rate structures have been in effect, shippers of both long- and intermediate-haul traffic have been accustomed, when using rail service, to moving output to market for about the same charges, despite the difference in length of haul. Freight covered by such group rates has moved at charges designed to yield the carrier an adequate return on the combined movement, including the difficult hauls and the less costly ones. Rate levels high enough to accomplish this objective have often made it easier for rival carriers to underbid railroads for intermediate hauls which motor carriers are especially well fitted to provide.

As a result, railroads have often found themselves losing a large amount of highly valuable traffic while being left with a disproportionate share of long-haul or inconveniently located business. These developments have increased the urgency of their demands for revised regulatory treatment and have at the same time intensified the disruptive impact, already noted, of transportation changes upon established competitive relationships among producers, marketers, and processors.

CHAPTER 3.–FARM PRODUCTS TRANSPORTATION AS A COMPETITIVE INDUSTRY

Proposals to grant wider latitude to rail carriers in competing for farm product traffic are generally based on two premises. The first, already discussed, is the presumption that inequities in present regulation have contributed to adverse trends in the rail carriers' traffic share and should, in fairness, be reduced. Second, since freedom from rate regulation would enable the railroads to make further rate reductions in attempting to hold or regain traffic, it is assumed that these would result in generally lower transportation costs for the economy as a whole–a saving which could be divided in some proportion among shippers, processors, middlemen, and consumers.

If railroads were free to set whatever rates they chose for farm traffic in competition with other carriers, there is no assurance that the railroad industry would pass on the benefits of that competition to all–or even to most–shippers or, if it did do so, that such an industry would for long remain competitive. Two questions must be answered. The first is whether the competition to which railroads are now subject is widespread and efficient enough to replace regulation in safeguarding shippers generally against excessive charges. The second question is whether relationships among carrier types are such that intermodal competition would continue to exist and be beneficial to shippers and the economy as a whole in the face of unrestrained rail ratemaking. Neither of these questions can be answered categorically.

This chapter approaches the first question by applying to the market for farm product transportation the tests usually used to determine whether any market is workably competitive. Evidence that these criteria are largely satisfied–at least for most traffic–is presented without regard to doubts over the ability of the carrier types to remain competitive with less regulation. Industry characteristics which bear significantly on that longer run question are considered in chapters 4 and 5.

The only conclusions presented in these or later chapters are those based on economic analysis from the standpoint of overall resource allocation at the national level. While such analysis often has policy implications–some of which will be spelled out–they do not in themselves constitute recommendations. In deciding questions of transportation policy, decision-makers take account of many factors relating to the economic and noneconomic interests of particular groups or regions, some of which may outweigh broadly national economic considerations as defined above. Economists ask only that the economic costs and benefits of alternative courses of action be clearly understood.

Measuring Competition from the Standpoint of the Carrier

The evidence of competition that business firms find most convincing and relevant is its direct and identifiable impact on their profits, and particularly on their ability to sustain profits for any extended period at levels higher than those needed to keep them in business. Judged by this standard, most rail carriers would cite their traffic share and relatively unsatisfactory earnings as proof that transportation in general is highly competitive and that this competition has affected them very seriously in recent years.

Table 13 shows that 1965 profits provided railroad shareholders a return of only 4.6 percent on their equity; this represented the best return in nearly a decade and occurred during a year of high economic activity with corresponding demands on the Nation's transportation system. Comparable earnings ratios for other heavy industries were generally much higher: 13.5 percent for producers of electrical machinery, for instance; 14.1 percent for those making machinery of other types, and 19.5 percent for makers of motor vehicles and equipment (table 14). Even the basic iron and steel industry, which like the railroads has been confronted with competition in many traditional markets from makers of substitutes such as plastics, or metals with recently developed applications, reported earnings that provided nearly a 10-percent return on equity.

These data are all for heavy industries with large capital investment, and hence may fairly be compared with the results obtained for the railroad industry. Direct comparisons of railroad profit ratios with the much higher ones (16 percent in 1965) reported by the regulated portion of the motor carrier industry are less meaningful since they reflect the relatively lower capital requirements of trucking as well as differences in operating results. They are, of course, pertinent measures of relative attractiveness to

Table 13.–Earnings levels and trends, by type of carrier, 1956-65

Year	Railroads	Motor carriers of property, intercity	Inland and coastal waterway carriers	Oil pipeline
	Percent			
	Ratio of net income to shareholders' equity			
1956	5.2	11.0	12.1	18.2
1957	4.3	10.5	8.7	16.3
1958	3.5	8.5	6.2	16.3
1959	3.3	12.6	5.4	17.6
1960	2.6	4.9	5.7	15.7
1961	2.2	10.2	6.1	16.3
1962	3.2	12.4	7.6	17.6
1963	3.6	12.1	9.5	16.0
1964	4.0	13.6	13.4	16.0
1965	4.6	16.0	11.9	16.2
	Ratio of operating expenses to operating revenues (operating ratio)			
1956	76.9	96.5	88.1	49.4
1957	78.4	96.5	88.6	52.7
1958	78.9	96.7	91.0	53.5
1959	78.4	95.7	92.0	52.1
1960	79.5	97.5	91.7	53.6
1961	79.2	96.1	90.4	52.9
1962	78.6	95.9	89.7	52.3
1963	78.0	95.9	87.5	52.0
1964	78.5	95.5	86.4	57.7
1965	76.9	94.0	85.0	56.5

Source: 80th Annual Report of Interstate Commerce Commission.

Table 14.–Relation of profits after taxes to stockholders' equity, and to sales, private manufacturing corporations, by industry group, 1958-65

Industry	Ratio of profits after federal taxes (annual rate) to stockholders' equity							
	1958	1959	1960	1961	1962	1963	1964	1965
	Percent							
All private manufacturing corporations	8.4	10.2	9.1	8.7	9.6	10.1	11.4	13.0
Total durable	7.8	10.1	8.4	8.0	9.5	10.0	11.5	13.8
Lumber and wood products (except furniture)	5.6	9.2	3.7	3.9	5.7	8.1	9.4	10.1
Furniture and fixtures	6.2	8.5	6.4	4.8	7.7	8.2	9.8	13.4
Stone, clay, and glass products	10.0	12.4	9.6	8.7	8.7	8.6	9.3	10.3
Primary iron and steel industries	7.1	8.0	7.3	6.1	5.4	6.9	8.7	9.8
Primary nonferrous metal industries	5.9	7.8	7.2	7.0	7.4	7.6	9.6	11.9
Fabricated metal products	7.3	7.8	5.5	6.0	7.8	8.1	10.0	13.2
Machinery (except electrical)	6.8	9.6	7.5	7.7	8.9	9.6	12.1	14.1
Electrical machinery equipment and supplies	9.9	11.9	9.2	8.8	9.7	9.9	11.0	13.5
Motor vehicles and equipment	8.1	14.1	13.3	11.3	15.9	16.4	16.8	19.5
Aircraft and parts	12.7	8.0	7.2	9.2	12.2	11.1	11.9	15.2
Instruments and related products	10.3	12.6	11.1	10.2	11.9	11.9	13.8	17.5
Miscellaneous manufacturing, including ordnance	8.0	9.1	8.9	9.7	9.3	8.7	9.3	10.7

Source: Economic Report of the President, transmitted to the Congress, January 1967, together with The Annual Report of the Council of Economic Advisors.

investors and hence of ability to attract new equity capital. A more meaningful way of relating rates of return for railroads to those of other carrier types is to compare their respective trends over time. On the basis of this comparison, motor carriers have had an increasing advantage in recent years, while railroads have lost ground. The performance of waterway carriers has fallen between these two.

The aggregate volume of business available to the transportation industry is highly cyclical, since demands for transport services in general (though not for agricultural shipments in particular) are closely related to levels of economic activity. As table 13 shows, this cyclical characteristic is reflected in the earnings of all carriers. Over the past decade, business recessions have affected rates of return to motor carriers even more than those of railroads, since the declines have represented sharp but temporary breaks in a generally rising trend. For railroads, on the other hand, the recovery in profit margins associated with strong upswings in business activity has often appeared as the interruption of a generally downward trend.

For the railroad industry annual returns on shareholders' equity declined steadily from 1956 through 1961; they were only 2.2 percent in the latter year. Over the same period, motor carrier profits also declined sharply during the recession years of 1958 and 1960 but recovered promptly on each occasion. Since 1961 there has been continuing economic expansion, and profit ratios for both carrier types have moved upward. But comparisons between recent profits and those during an earlier period of sustained high-level economic activity emphasize the difference in performance among the transportation modes. While annual returns to investors in Class I motor carriers averaged 13.7 percent for 1962-65—about 20 percent above the average return during 1955-57—those for rail carriers fell from an annual level of 5 percent in the earlier period to an average of less than 4 percent for 1962-65. Profit trends for waterway carriers have been less expansive than those for motor carriers but have been much more favorable than for railroads.

Striking as these comparisons are, they understate the divergence in operating performance among the major modes of transportation. Rising levels of economic activity might have been expected to benefit railroad profits more than those of other carrier types. Truck and barge operators find that their costs reflect increases in traffic volume more directly than do those of railroads. In part this is because they utilize rights-of-way provided by the Government. Barges make almost no payment for using the waterways, and while truckers pay substantial amounts for highway use, most of these payments are closely associated with the extent of that use. Tax payments reflect the number of trucks operated and the number of miles they travel. Railroads, on the other hand, own their rights-of-way, maintain them, and pay taxes on them regardless of traffic volume.

Moreover, the capital structure of many railroads is highly leveraged. This means that a high proportion of their large investment in fixed capital is represented by debt rather than equity instruments, and annual interest charges on debt must be met regardless of traffic volume. When operating income is down, not much remains for profits.

In an industry with these cost characteristics, the rise in total traffic volume during periods of general economic expansion would tend to generate more than proportional increases in net income unless that rise were being offset--at least in part--by unfavorable trends in rates or in traffic composition. Failure of railroad profits to respond decisively to the economy's sharply expanding transportation needs reflects both the railroads' failure to obtain a proportional share of growing traffic volume and also a shift in the composition of their traffic from more to less profitable components. The vulnerability of profitable intermediate- and short-haul traffic in farm products to competition from unregulated carriers has been one factor in this shift, though by no means the only one.

It should be noted here that differences in capitalization between railroads and other carrier types make the "operating ratio" (shown in the lower panel of table 13) an inappropriate measure for comparing intermodal profitability. This ratio, which is computed by expressing operating expenses as a percentage of operating revenues, is generally used to measure changes in a carrier's efficiency over time. In an industry such as trucking, with low capital requirements relative to operating volume, nearly all expenses are operating expenses, and although these absorbed 94 percent of operating revenues in 1965, the remaining 6 percent was enough to provide stockholders a 16-percent return on equity. Rail operating ratios are far lower. In 1965, 23 percent of operating revenues remained after all operating

expenses had been met. But with the more extensive investment base, much of this was required to meet debt service charges, and the share actually carried through to profits represented less than a 5-percent return on equity.

Whatever method is employed to measure profits, rail earnings have been far from excessive in recent years, and have indeed been so low relative to returns available elsewhere as to handicap railroads seeking funds for modernization and improvements. For most roads, this is not a problem in purchasing rolling stock, which is generally financed through equipment trust certificates or conditional sales contracts, but has been of concern to many roads for projects which normally require long-term debt or equity financing. In regulated industries, investors are generally prepared to accept long-term bonds with lower coverage ratios than they would require for most industrial securities, but this is because they rely on the regulatory authorities to set rates that will maintain an adequate return to the issuing company. In the case of railroads, recent experience has not reassured investors that the ICC is able to "guarantee" returns on railroad investment—even in the 4- to 6-percent range. Profit trends have been particularly unsatisfactory in view of the generally expansive character of the economy over the same period and its growing demands for transportation.

Even when considered in conjunction with the superior earnings trends of rival carriers, especially trucks, these difficulties cannot be ascribed exclusively to intermodal competition. Railroading has had chronic problems for years, particularly in the Northeast. A partial list would include, for example, heavy taxes associated with the high investment in real property, chronic deficits on passenger and commuter operations, top-heavy debt structures for some roads, and an undue proportion of inefficient or outmoded terminal facilities.

But competition has played an important role, and this conclusion is underscored by the failure of rail carriers to maintain their share in the growing traffic total. Moreover, profit levels have consistently fallen below the returns which public authorities customarily permit companies in regulated industries to earn. Under these circumstances, there can be little question that competition for traffic from rival carrier types rather than direct regulatory action has been the limiting factor in holding rail profits substantially below any level that could be considered excessive.

Measuring Competition from the Standpoint of Transportation Users

Some advocates of freeing rail rates on farm product traffic from regulation consider the evidence presented above sufficient proof that transportation is now a fully competitive industry. From the standpoint of transportation users, the effectiveness of competition can be judged only through its impact on the cost and availability of transportation service.

This distinction was made very clearly by E. H. Chamberlain[16] in answer to claims already being voiced at the time that the impact on railroads of competition from other carriers made regulation unnecessary:

> "Parenthetically, there might be mentioned an argument frequently encountered, especially in the field of public utilities and railroads: that a field is competitive if profits are not excessive. Thus it has been held that the railroads need no longer be regulated since their profits are held in check by the competition of other forms of transportation...The answer is, of course, that profits are only one element in the situation; rates, discriminatory practices, service in all its aspects, investment, and other policies may be strikingly influenced by monopoly elements, even though profits are not excessive."

Writing at a time when intermodal competition was localized and specific rather than widespread and general, this observation constituted a dismissal. The point was made "parenthetically," as Chamberlain said, because the extent to which monopoly elements would influence rates and terms to specific shippers if controls were suspended appeared at the time to be self-evident. Since then, however, trucks, barges, and combinations of the two have increased their geographic penetration and scope of service so much that it is pertinent to ask whether intermodal competition

[16] Edward Hastings Chamberlain. The Theory of Monopolistic Competition. pp. 195-196. Harvard University Press, 1948 ed. Also, Richard Caves. Direct Regulation and Market Performance in the American Economy. Amer. Econ. Rev. LIV (5): 172-181. May 1964.

does not provide shippers generally with adequate safeguards against excessive rates or deficient service.

Rate Trends and Levels

So far as rail shippers are concerned, proof that intermodal competition has become highly effective is the striking series of rate reductions that railroads made between 1958 and 1967 in direct response to the growing traffic diversion. By 1958, the need to meet intermodal competition for specific hauls became the major determinant in railroad proposals for rate changes. The cumulative impact of such reduction on average rates for traffic of different types is shown in table 15.

From 1955 through 1958, as throughout the entire period since World War II, railroads responded to relatively low profits by seeking regulatory permission to adjust rates upward. The presumption that the additional revenue collected from increased rates would more than offset any expected traffic loss, was rational for industries where demand was expected to be inelastic. By 1958, most railroads recognized that this policy had become self-defeating because acceptable alternatives were so widely available to so many shippers. After that time, the preponderance of rate adjustments turned sharply downward despite rising labor and material costs. By 1963, average rates on all commodities, which had risen 13 index points from 108 to 121 between 1955 and 1958, were about back to the 1955 level.

Though the cumulative impact of increasing costs—which were also, of course, affecting rival carriers and their rates—eventually led railroads to seek a general rate increase, the total sought was little more than 3 percent. This request was largely granted by the Interstate Commerce Commission in mid-August 1967.

These trends apply to all classes of freight, though the decline has been less notable for products of forests and mines, probably because many shippers of such commodities still do not have acceptable transportation alternatives. Of more specific interest for this report are the relative trends for rates on manufactured and miscellaneous commodities, where rival for-hire carriers are themselves subject to regulation, and those on unprocessed farm commodities where competing carriers have been free to set their own rates.

Have the carriers of unregulated commodities performed more effectively than the carriers of regulated commodities in limiting the rates charged by rail carriers? The answer cannot be clearcut, however, since many large industrial and commercial shippers—unlike most farmers—generate traffic in sufficient volume to warrant acquiring and operating their own transport equipment. In attempting to hold the business of these highly important shippers, railroads face "competitive" pressure from this source just as they do from unregulated for-hire carriers in the case of farm traffic.

For both classes of commodities, these competitive pressures have been evident in rate changes. And the pattern—rising rate indexes through 1958, followed by declines to average levels below those prevailing in 1955—has been the same for both. As table 15 shows, however, rates on products in the two agricultural categories showed greater stability over the period as a whole than did those for manufactured goods, rising somewhat less sharply in the fifties and not declining so steeply thereafter. The railroads seem to have been more keenly conscious of competition for traffic in unprocessed farm products at an earlier date, and this, together with the relatively depressed conditions in agriculture, had the effect of restraining rate increases in that area. But actual experience with traffic trends for all commodities under increased rates has since forced a more general retreat.

These data are not adequate to "prove" that competition, as it now exists among carrier types, is bringing about fully competitive pricing in the textbook sense: that is, is forcing rates toward an equilibrium level at which each carrier can just afford to offer service and earn enough profit to stay in business. But they certainly indicate that the benefits of competition are being passed on to shippers in the form of reduced charges. By this test, and it is a crucial one, rail transportation is now part of a competitive industry.

Protection Against Discriminatory Practices

If the elimination of all practices cited as "monopoly elements" by Chamberlain were prerequisite for freedom from regulation, perhaps few industries in the United States would qualify. Vulnerability to such practices, however, is a matter of degree, and the

Table 15.–Indexes of average rail freight rates for major groups of commodities, 1955-65

[1950 = 100]

Year	All commodities	Livestock and animal products	Products of–			Manufactured and miscellaneous
			Agriculture	Mines	Forests	
1955 . . .	108	112	109	107	113	108
1956 . . .	112	116	112	110	117	112
1957 . . .	118	123	117	115	124	119
1958 . . .	121	122	119	118	127	123
1959 . . .	118	118	114	117	125	118
1960 . . .	116	116	112	115	124	115
1961 . . .	114	113	111	116	124	113
1962 . . .	112	110	110	114	121	110
1963 . . .	109	106	107	112	119	107
1964 . . .	107	N.A.	N.A.	N.A.	N.A.	N.A.
1965 . . .	105	N.A.	N.A.	N.A.	N.A.	N.A.
	– *Year* –					
High year .	1958	1958	1957	1958	1958	1958
Low year .	1955	1963	1963	1955	1955	1963

N.A. = not available.

Source: Indexes of Average Freight Rates on Railroad Carload Traffic Statement RI-i 1963 (January 1966) Bureau of Economics, Interstate Commerce Commission.

possibilities for discrimination inherent in the transportation industry are greatly magnified because the bargaining position of each shipper is unique to his own particular location and shipping needs. Under unregulated market conditions, rate concessions made to one shipper as a result of specific competitive pressures are not likely to be extended to any others who do not possess equivalent bargaining leverage.

Proposals for less regulation of rail ratemaking for farm products, therefore, must show that competitive pressures would be widespread and inclusive enough to warrant a general relaxation of controls. This cannot be demonstrated categorically, but conditions in the transportation industry now make such a result far more likely than it would have been when Chamberlain wrote in 1948. Most shippers now have options among transportation alternatives, and these greatly reduce their vulnerability.

Competition among carriers will no more eliminate such pricing altogether than does competition among retail auto dealers. In both cases, the keener the competition, the likelier that alert and well-located customers could drive hard bargains. Conversely, as among retailers, carriers are motivated to vary their charges, if they can, at the expense of less favorable situated bargainers. The auto buyer's protection against such tactics is his ability to "shop around," and most–though not all–shippers can now take a comparable initiative, even to the extent of owning or leasing their own transportation equipment.

A difference of degree remains. The inherent bargaining power of equally aggressive customers is less equal in bargaining for transportation services than for automobiles. While the best bargain made by any shipper demonstrates that the carrier is willing to move traffic on those terms rather than lose it, this knowledge–even if it is available to other shippers–is no guarantee that others can obtain equivalent service. Geographic location is a readily apparent characteristic that disadvantageously located producers cannot disguise or minimize through bargaining tactics.

Producers who are forced by their location to rely on the services of a single carrier remain vulnerable to shipping charges which are excessive by the standards of competitive market pricing. Rates are excessive in this sense not when they are higher than those charged more favorably located producers, but when they significantly exceed the carrier's cost of providing service, including a reasonable profit. In any major reduction of regulation over the rates railroads charge and the services they offer for farm traffic, such "captive" shippers might need continuing regulatory protection perhaps by linking the carrier's

maximum charges in some reasonable fashion to the cost of providing service. (Indeed, it is possible that antitrust legislation already supplies a legal basis for such protection.) But it is easy to overemphasize the difference in this respect between transportation and other industries where competition—though imperfect—is generally recognized as workable. Most shippers do, in fact, have alternatives among carriers, either of the same or of different modes (ch. 6).

Shippers whose traffic moves for short distances often do not have intermodal transportation alternatives, largely because neither rail nor barge carriers can compete successfully with trucks for short-haul traffic in terms either of cost or of convenience. But there is strong intracarrier competition among truckers for farm traffic of this sort, and many shippers find the acquisition and use of their own equipment feasible. Those who rely on for-hire transportation can usually expect to obtain service at rates closely related to truck costs.

The effective range of intermodal competition at the present time covers intermediate-length hauls, a highly variable term which depends on the type of commodity being moved and the presence or absence of backhauls. Distances ranging from 300 to 1,500 miles might be included (ch. 8). The outer limits of this range are still being pushed outward by increasing use of combination truck-and-barge hauls. Shippers of bulk commodities who are located within moderate-cost trucking distance of waterways have an effective choice among carrier types for even greater distances, so long as destinations are also located on or near waterways.

Among long-haul shippers of farm products many remain, however, who have as yet no economically feasible alternative to rail transport, at least for the major portion of the haul. If these shippers are captive to a single rail line, unregulated market pricing would subject them to rate discrimination. In the past, when trucks generally moved farm output only to the nearest rail siding, only a few favorably located shippers possessed alternatives among rail carriers. But now combinations of truck-and-rail service can offer a growing number two or more routes for the long-distance rail portion of the haul. Better highways, increasingly efficient highway equipment, and the development of trailer-on-flatcar (piggyback) service have increased the distances over which combined truck-rail service is economically feasible. If maximum use were made of truck-rail combination service, shippers located between the lines of different rail systems would enjoy effective alternatives in marketing their output, and the remaining pockets of "captive" traffic would be notably reduced.

As has been explained earlier, however, such combinations have achieved far less of their potential in moving farm products than have barge-truck combinations. The reasons for this relatively slow development are regulatory rather than technological. If rail carriers could furnish more extensive truck feeder service, rival railroads could invade each other's territories and provide strong intramodal competition within widely overlapping areas. But under existing regulations, railroads are not ordinarily allowed to provide pickup-and-delivery service with their own highway equipment beyond limited and rigidly defined areas within their own immediate territories. Nor are they usually anxious to participate in joint hauls with independent truckers after the pattern of truck-barge service, because they want to hold as much traffic as possible for underused and unprofitable branch lines. In some highly specialized situations, railroads do make contractual arrangements with truck operators to provide feeder service to mainline points, but such contracts are closely supervised by regulatory authorities.

As a result of such discouraging factors, combined truck and rail shipments of farm products generally reflect the initiative of shippers themselves in having output trucked to an alternative rail line. In this manner, competitive pressures are being established between adjacent rail systems, though these are probably less effective and certainly are less widespread than the more direct competition which could be achieved by multimodal transportation firms (ch. 10).

Still other "captive" shippers are finding that self-service transportation constitutes a workable alternative to competition among for-hire carriers. Individual or cooperative ownership or leasing of transportation equipment can be highly effective in limiting a sole carrier's upper bargaining range and is, in fact, a competitive recourse of great and increasing quantitative importance.[17]

---

[17] Thomas H. Camp and David Volkin, Owning or Leasing of Covered Hopper Cars by Farmer Cooperatives. U.S. Dept. Agr. Farmer Cooperative Serv. Gen. Rpt. 144, July 1967.

Other Market Criteria of Competition

The specific ways in which the services offered by the various carrier types are differentiated have been outlined in earlier chapters. Those affecting delivery time from the moment at which the shipper requests service are probably the most important. As already noted, trucks enjoy the greatest flexibility in being able to furnish immediate service for shipment amounting to as little as a truckload (far smaller than either railroads or barges would find economically feasible). And once transit starts, time on the road and in many cases the actual distances traveled are less over most highways than for rails. Both truck and rail shipments, of course, are significantly faster then comparable barge shipments.

Another notable difference includes the directness with which a shipment moves—ranging from truck service which may, in some instances, take produce all the way from the farm gate to the supermarket, to truck-and-barge hauls which may entail several complete transshipments. Important differences also exist in the ability of carriers to provide facilities for the protection or storage of cargoes that require special handling.

Given this wide range of service characteristics, competitive pricing for transportation services does not mean identical pricing, but a set of rates related to each other by differentials which reflect the premium that shippers are willing to pay for the service they prefer and the discounts other carriers must offer in order to attract a significant volume of business. Shippers benefit from this opportunity to choose the shipping alternative closest to their specific needs, while the existence of such choices in no way invalidates the process of competitive pricing.

This statement must be qualified somewhat because the importance to shippers of premium service characteristics varies widely. For some, prompt service is essential to their product's market value; at the other extreme, the actual but incidental storage provided by a long barge haul may constitute a positive attraction to certain shippers of low-value bulk commodities. For most shippers, however, choices among carrier types for particular hauls usually depend on the extent of rate differentials.

The shippers to whom premium services are most essential in providing speed, flexibility, or special handling for perishables are, in one sense, a captive market for carriers (usually trucks) able to provide these special services. Since such shippers are not protected by intermodal competition, they are potentially more exposed to discriminatory pricing. But this theoretical vulnerability does not appear to be serious in practice, since competition among truckers themselves ordinarily provides shippers who depend on specialized services with adequate bargaining alternatives. Easy entry into the trucking business—and particularly that segment devoted to hauling unprocessed farm products—is made possible by low initial capital requirements. And limited economies of size permit a large number of small operators to compete vigorously with each other.[18]

These same qualities also go further toward meeting the free entry and exit requirements usually set for pure competition than many modern industries. Truck—and to a lesser extent, barge—capacity can be expanded quite rapidly when and where rising demand creates profit possibilities. And since most of the investment is in mobile equipment, it can also be contracted rapidly in any area where overexpansion has occurred. These characteristics provide substantial flexibility in overall capacity for moving the Nation's agricultural output despite the near absence of any provision for entry or exit from the railroad business as it now exists.

Even the further condition of an established market in which all participants have substantial knowledge of the terms on which other transactions are occurring is better met than appears at first glance. Even though motor carriers and barge operators engaged in hauling unregulated commodities need not publish or adhere to published rates, many often choose to do so. Moreover, in many areas, transportation brokers bring shippers and carriers together, and their activity approximates the operation of a market in unregulated transport for many farm products.[19] In instances where costs are closely comparable, rates tend to reflect this uniformity.

[18] Merrill J. Roberts. Some Aspects of Water Carrier Costs: Firm Size, Efficiency, and Financial Health, Land Econ. 32(3): 228-238, August 1956.

[19] John H. Hunter. The Role of Truck Brokers in the Movement of Exempt Agricultural Commodities. U.S. Dept. Agr., Mktg. Res. Rpt. 525, February 1962.

The traditional economic advantage of competitive pricing lies in the pressure it brings on individual carriers to underbid rivals for each haul. Where competition is close and effective, each carrier seeking traffic from a particular shipper must offer service at a rate very close to his own cost of providing it and the successful bidder for each shipment will be the one who can provide that service at the lowest cost. As competitive pressures strengthened among carriers seeking to haul farm products, the pressures were reflected in the pricing of transportation service to a rapidly rising proportion of farm shippers. These developments are producing savings in the aggregate cost of moving farm products to market, both financially and in terms of resources used, but they have not been universally welcome to all market participants. Advocates of substantial freedom in rail ratemaking hope that such action would further extend the advantages of competitive pricing. They are opposed not only by those who are convinced such an attempt would be self-defeating, but also by those who believe competitive pricing itself is not desirable for farm product traffic.

These arguments are sometimes presented as though they overlapped. In fact, they are logically distinct and even incompatible. Those who challenge the desirability of competitive pricing do so because they believe that the rate relationships which were established when almost all traffic was moving in accordance with regulatory requirements among hauls from dissimilar locations to dissimilar destinations were beneficial to agriculture and related industries and should be preserved. Many of these relationships, however, no longer exist. They are gradually being eroded by intermodal competition that has already developed under present regulations. Greater ratemaking freedom on the part of rail carriers would do no more than accelerate the disruption which has already occurred among established relationships. The restoration of these relationships would require greatly expanded regulatory controls over all modes of transportation and would logically need to include even the provision of service in equipment owned and operated by shippers themselves. For proponents of traditional rate relationships, opposition to less rail rate regulation represents only a limited block to the trend toward competitive pricing.

Opposition to loosening present restraints on rail carriers, however, comes also from many who have welcomed the trend toward competitive pricing of transportation services. These opponents are convinced that any significant lessening of regulation, far from extending the present scope of intermodal competition, would jeopardize rate and service gains that have already been achieved, because truck and barge operators might be unable to continue indefinitely competing with unrestrained ratemaking by rail carriers. Such fears stem from two sources: first, the great differences in carrier size and industry structure among the modes of transportation, and second, certain more technical but far more fundamental problems posed by differences in cost structure and capacity utilization among the carrier types.

The Desirability of Competitive Pricing

Intermodal competition for farm product traffic has disrupted established patterns of production, distribution, and processing because the traditional structure of rail rates was intended not merely to provide the carriers with adequate earnings but to accomplish other economic objectives as well. As explained in chapter 2, rate structures for many farm products were designed to guarantee that major marketing centers would attract production from a wide enough geographic area to warrant establishment of organized commodity markets on a large scale and to assure competition among a large number of producers. They were also intended to guarantee that producers would have some geographic choice among market outlets so that processors and distributors at such alternative markets would compete with each other.

To increase the number of producers having access to a particular market, shipments for different distances from a number of different origins were often grouped at nearly the same rate, while competition among distributors and processors was assured by permitting shipments to several alternative markets, sometimes in widely differing locations, at about the same rate. The geographic areas covered by such group rates varied widely, but in some cases–especially that of grain–entire producing and

consuming regions were "blanketed" as equivalent groups of origins and destinations.[20]

Wherever a producer happened to be located within such a region, he knew that his transportation charges to major markets would be about the same as those of area competitors. At the same time, processors and distributors of the same commodities had comparable assurances that their dissimilar locations would be neither an advantage nor a disadvantage in attracting business.

For many years, these assurances were facts of economic life around which production was undertaken, businesses built, capital committed, and market values established. For products to which group rates were applied, the physical location of producing regions, marketing centers, and processing operations reflected in some degree this deliberate equalization of costs to shippers for transportation services which carriers could not provide at equal cost. Wherever the emergence of intermodal competition translated differentials in carrier costs into differentials in rates (shippers' costs), some disruption in the competitive relationships existing among producers, marketers, and processors was inevitable.

Where group rates had blanketed wide areas or masked wide discrepancies in the cost of service rendered over different hauls, disruption of the competitive relationships has been acute. Physical accessibility to markets (or, in the case of processors and distributors, to raw materials on the one hand and ultimate consumers on the other) can become a decisive advantage to some and its lack of crippling disadvantage to their rivals. To those directly affected by such developments, this concentrated impact on their own competitive position has been far more immediate and apparent than the overall savings in transportation costs which are being brought about by improved technology and increased competition.

Even those who recognize that such savings are occurring generally feel that the disadvantages to their industries from disrupting long-established relationships outweigh those advantages. Many specialists in the transportation industry concur in this belief. Some of them argue broadly that the old considerations of orderly marketing and widespread participation, which in earlier years led to the establishment of group rates over territories broad enough to foster such markets, still apply. Others base their position more narrowly on grounds of equity to agricultural and other business interests that were built or acquired under the shelter of legally protected conditions.

Rapid population growth and even more rapid transportation improvements have greatly eroded the force of the broad economic argument. Land utilization and population densities have increased, while the geographic radius of competitive marketing areas, as determined by transportation costs to the carriers, has been greatly widened through technological improvements in transportation. The marketing areas defined by competitive transportation rates are far larger than they would have been in the past and are generally large enough to support organized marketing and processing centers and to assure competition among producers, marketers, and processors. Once numbers are adequate to accomplish these economic objectives, adding more participants to each market does not, in itself, increase the economic efficiency of the process.

Other economic arguments in favor of maintaining some arbitrary equalization of freight charges in areas where these have traditionally existed are based on the impact of their abrupt discontinuance on market participants. Major disruptions of established marketing and processing patterns have significant shortrun costs for the economy, adversely affecting the value of existing facilities, and perhaps in extreme cases even by forcing their abandonment. In addition to the individual hardships involved, these are costs to the economy as a whole.

But attempts to preserve, without change, rate relationships established to fit conditions which no longer exist also impose important longrun costs on the economy as a whole. These economic costs must be balanced against those incurred through the transition to competitive pricing. And when such a comparison is made, a decision to forego the advantages of competition cannot be justified on strictly economic grounds. The belief that it can presupposes that two dissimilarly located shippers who are enabled by equal transportation charges to compete "equally" in dissimilarly located markets are receiving "equal" treatment.[21] This is not so. The illusion that it is stems from the fact that the two may have

[20] D. Philip Locklin. Economics of Transportation. Ed. 6, pp. 189-192. Irwin. 1966.

[21] Locklin, op. cit., pp. 184-189.

identical operating efficiencies within their own barnyard gates. But from the standpoint of the economy as a whole, they are not equally efficient if shipments from one location cost more to move to market than from the other. "Equal" market opportunity can be provided only by discriminating against the better located producer and in favor of production which, by reason of distance, difficult terrain, or the inaccessibility of low-cost transportation, cannot be taken to the consumer except at a higher cost.

Cost of production and distribution must be considered together. Economic efficiency is concerned with the total allocation of resources, and the location of producing, processing, and marketing facilities is one element—often a very significant one—in determining total economic cost. In the past, group rates for shippers largely canceled these resource-cost differentials over territories of varying size. Marketing areas became more extensive (and more expensive in terms of resource utilization) than would have been warranted if rates for moving the same products had reflected the difficulty of providing transportation service from different locations. The fact that costs were often pooled and averaged obscured the higher total cost of uneconomically located production or processing facilities.

Competitive pricing for farm product transportation services tends to compel rival carriers to supply each shipper with service at its cost to them. Where effective, competition also tends to allocate traffic to the modes of transportation able to haul most efficiently. Thus the immediate and measurable advantage of increased competition, given present locations of production, processing, and marketing centers, is to minimize aggregate transportation bills for the economy as a whole. Over the longer run, the geographic rate differentials which are being reestablished by competitive pricing foster geographic patterns that minimize total economic costs, including the cost of transportation.

Where long-standing geographic patterns are uneconomic, this process cannot be carried out without transitional readjustments and some economic cost. But such adjustments are already resulting in reduced rates to favorably located shippers by truck and barge operators and by the use of shipper-owned or leased transportation equipment.[22] Even though rail carriers remain fully subject to regulation, their rates also are coming to reflect more closely differences in location among producers and processors as the ICC authorizes them to meet competition for specific freight movements with rate reductions. The need to make such reductions promptly under competitive circumstances was explicitly recognized by Congress in the Transportation Act of 1958. If railroads had more freedom in ratemaking, they would merely accelerate these trends toward competitive pricing.

When tested by economic criteria, intermodal competition appears to be bringing general benefits to agricultural producers and consumers and the extension of freer bargaining to the rail segment of transportation could potentially enhance these advantages. In terms of economic analysis, the crucial question is the feasibility of free competition for farm product transportation—not its desirability. The disruptive impact on individuals of the transition to competitive pricing cannot be ignored by the economist, but he will recommend that any measures adopted be directed toward easing that transition, rather than toward perpetuating uneconomic locations for production, processing, or distribution facilities by a freezing of rate relationships in some historical pattern.

Industry Structure and Ability to Compete

Many who oppose less rail rate regulation fear that truck and barge carriers could not remain competitive in the face of unrestrained rail competition. They are convinced that rail carriers could eliminate competing modes of transportation in many areas and for many types of traffic.

The question of whether truck and barge operators could hold their "shares" of farm product traffic depends in part on how these "shares" are defined. Ability to compete successfully at a given time does not imply perpetual immunity from competition, and any improvement in the present competitive position of the railroads would entail at least some loss of relative advantages presently enjoyed by rival carriers.

The critics of more freedom from regulation fear that recapture by the railroads of any traffic previously lost to other modes of transportation would demonstrate the inability of competition to regulate farm product transportation in the longrun best interest of the economy as a whole. The

[22] Thomas H. Camp and David Volkin. Owning and Leasing of Covered Hopper Cars by Farmer Cooperatives. U.S. Dept. Agr. Farmer Cooperative Serv. Gen. Rpt. 144, p. 33, July 1967.

self-regulation provided by competitive markets consists in allocating specific traffic to the carrier able to handle it at the lowest cost, and gains in rail traffic as a result of wider competitive latitude might be quite consistent with that function. The relevant questions are instead: Would railroads obtain traffic to which they were not entitled on a resource utilization basis? Would they obtain enough traffic to jeopardize the continued existence of intermodal competition?

Those who believe they could—and inevitably would—do both of these things base their arguments on the very marked differences of industry and cost structures among the rival modes of transportation. This chapter will show some obvious differences in industry structure and consider their probable impact on ability to compete. The following chapter deals with the more complex questions of cost relationships and capacity utilization.

In their least sophisticated form, arguments that the railroads—if uncontrolled—could establish monopolies over many areas of transportation are based simply on the fact that many railroads are larger and more extensive geographically than truck and barge competitiors. These differences are presumed to confer undue competitive advantages. The structural diversity of the carrier types exists, but it is not clear that the differences have a significant impact on relative ability to compete.

Rail Transport

Over 400 railroads operate 220,000 miles of line throughout the United States, but most of the business is done by about 76 roads which are designated Class I under the ICC system of classification. Class I railroads have annual revenues of $5 million or more; their present numbers can only be estimated, because levels of income vary with business conditions during the year. These roads own or lease over 95 percent of the track mileage in the United States. The actual degree of concentration is much greater, since 18 of them control over 80 percent of the total miles of railroad and receive over 60 percent of all rail freight revenue collected by all railroads.

Motor Transport

Capacity to haul freight by truck is far more widely distributed. Of the 14.7 million trucks on the road in 1966, just under 1.4 million are regularly available for transport on a for-hire basis. More than nine-tenths of the others are classified as private—that is, their owners are not primarily engaged in the transportation business but operate trucks for their own business use. More than 3 million of these (mostly small) are licensed as farm trucks, and other privately operated trucks are sometimes used in hauling unmanufactured farm commodities part time.

Despite the very large total number of trucks, the hauling capacity of the industry is concentrated in the hands of carriers who operate the "big" highway equipment. There are about 1 million "combinations"—tractors and trailers with three, four, or five axles. Slightly over half of these are for hire.

The importance of these "combinations" in the Nation's transportation system can be indicated, however inexactly, if it is assumed that each one, on the average, hauls 10 tons when loaded, travels 50,000 miles each year, and moves loaded 70 percent of the time. These figures are probably conservative, since the American Trucking Association estimates that intercity trucks hauled 11.05 tons per load and traveled 57,881 miles in 1964. These estimates indicate an actual annual hauling capacity of 350 billion ton-miles for these million pieces of large highway hauling equipment.

Since total intercity traffic hauled by trucks in 1965 was just over 370 billion ton-miles, "combinations"—which represent little more than 7 percent of all registered trucks—had the capability of moving more than 90 percent of the Nation's intercity truck traffic. The tremendous carrying capacity of the big trucks is demonstrated even more impressively when it is realized that these million over-the-road units were capable of moving nearly half as much traffic as the 709 billion ton-miles moved by the railroads in 1965.

The individual carriers operating these and other trucks are very numerous and mostly small compared with railroads. In 1965, 15,426 truckers reported to the Interstate Commerce Commission, and since reporting is required only for those hauling regulated commodities in interstate traffic, this figure does not include carriers who haul exempt agricultural commodities or intrastate carriers. Carriers in both these categories are probably smaller—on average—than those reporting to the Commission; it is also reasonable to assume that their numbers are considerably larger.

Most carriers who haul regulated traffic have annual gross operating revenues below $200,000–11,453 of them in 1966 (table 16). But not all truck operators can be classed as small business: In the same year, 1,298 firms reported operating revenues of more than $1 million, and revenues for the other 2,675 respondents fell between these limits.

Larger truckers move an annual volume of traffic at least equivalent to the smaller Class I railroads. Motor carriers certificated to haul "general commodities" are the category of truck operators most closely comparable to common carriers such as the railroads. Of nearly 6,000 carriers in this group, more than 100 reported doing over $10 million in trucking business during 1964; collectively, they took in more than half of the operating revenue reported by the entire group. Carriers doing more than $1 million of business annually made up only one-eighth of all general commodity carriers, but reported more than 85 percent of the revenue. Conversely, firms doing an annual business of less than $200,000–two-thirds of the total–collected only 4 percent of the operating revenue.

Although precise statistics are not available for carriers of unmanufactured farm products, relatively small operators are known to account for a much higher proportion of the total business. A rough idea of the magnitude of the difference between this traffic and that in regulated commodities may be gained through comparisons drawn from the 1963 Census of Transportation. According to that survey, half of all trucks used in interstate hauling of unprocessed farm products were operated by carriers with less than 5 vehicles, and only one-fourth of the total were operated as part of fleets with 10 or more units. On the other hand, only one-fifth of the truck-tractors used by regulated motor carriers were operated by carriers with less than 5 units, and nearly 70 percent were operated by those with fleets of 10 or more.

Among the regulated carriers of general commodities reporting to the ICC, the proportion of business done by relatively small operators has been declining, as have their numbers. But this gradual growth in size among existing carriers need not reflect significant competitive advantages for the large carriers. It is quite consistent with the growth trend in traffic for the transportation industry, since the

Table 16.– Number of motor carriers by size of business, selected years

Year	Class I	Class II[1]	Class III[1]	Total
	$100,000 or more	$25,000 to $100,000	Under $25,000	
1940	1,202	25,206		26,408
1945	2,001	18,871		20,872
	$200,000 or more	$50,000 to $200,000	Under $50,000	
1950	2,053	17,544		19,597
1955	2,843	15,298		18,141
1956	2,939	14,957		17,896
	$1,000,000 or more	$200,000 to $1,000,000	Under $200,000	
1957	933	2,055	14,779	17,767
1958	988	2,167	14,105	17,260
1959	1,009	2,256	14,383	17,648
1960	1,053	2,276	12,947	16,276
1961	1,106	2,336	12,556	15,998
1962	1,148	2,495	12,340	15,983
1963	1,175	2,533	11,910	15,618
1964	1,195	2,536	11,748	15,479
1965	1,250	2,615	11,700	15,565
1966	1,298	2,675	11,453	15,426

[1] Separate figures of Class II and Class III carriers are not available prior to 1957.

Source: Interstate Commerce Commission and ICC Statement No. 589 and No. 6406; Interstate Commerce Commission Activities, 1937-62.

requirements for certification tend to restrain new entries into general commodity trucking. Indeed, the number of such motor carriers reporting to the Commission has declined in recent years.[23] Limited entry means that increases in overall traffic volume are reflected directly in increasing business for many existing firms, which move into successively higher revenue classes.

Data are not available to show whether there have been similar trends toward growing size among carriers who specialize in hauling unmanufactured farm products, but it is less likely. The growing volume of farm product traffic now being hauled may be adding to the business of existing operators, but it may also be attracting new carriers into this freely competitive area of trucking operations. Attempts to measure optimum size in motor transport have not revealed that large operators in the trucking industry enjoy any notable economies as a result of their size. The empirical evidence, while fragmentary, suggests that over-the-road equipment used in hauling unregulated traffic is fully comparable in quality, age, and maintenance with that employed by regulated carriers, although the latter are significantly larger firms, on the average. A more pragmatic test of ability on the part of small carriers has been the unwillingness of most large certificated carriers to bid against them for the increasing volume of farm traffic, despite freedom from regulatory restraints when doing so.

Waterway Transport

As in the case of over-the-road trucking equipment, the Nation's capacity for moving freight over the inland and coastal waterways is divided among operators engaged in for-hire activity and companies not primarily engaged in transportation who operate equipment mainly for their own use. But the proportions differ considerably. In contrast to the predominantly "private" ownership of over-the-road equipment, a 1956 tally of inland waterway equipment and its ownership (the latest available) showed 521 private carriers operating 20 percent of the 4,300 towing vessels then in service and 33 percent of more than 14,000 barges (table 17). Annual estimates on traffic shares indicate that these private carriers in 1964 accounted for a little over three-fifths of the coastal traffic and more than one-fourth of that on the Great Lakes (table 18). Their proportionate share in the intercity ton-miles of internal waterway traffic (principally the Mississippi River system) was about one-fifth.

More than three-fifths of this highly important internal waterway traffic was accounted for by for-hire operators who specialize in moving bulk commodities. Regulated waterway carriers, like their highway counterparts, are larger on the average than unregulated operators, but they provide a smaller share of aggregate operating capacity and move a smaller part (only about 20 percent) of all for-hire traffic. According to the 1956 survey, 163 general commodity and 41 regulated contract carriers controlled about 20 percent of towing vessels and less than 25 percent of barges. More than 1,000 exempt carriers, while individually smaller, had twice as many barges and more than three times as many towing vessels (table 17).

Moreover, the regulated water carriers, unlike regulated truckers, regularly use a considerable part of their equipment in hauling bulk commodities. In general, they do this at published rates, but those rates are not subject to regulatory approval, and the carriers are free to deviate from them so long as two conditions are met: the bulk traffic must not be intermixed with regulated traffic, nor can more than three bulk commodities be combined in a vessel. The predominance of bulk shipments in barge traffic reflects the strong cost advantage of water transport in moving commodities that lend themselves to this type of handling.

Significance of Size Differences for Intermodal Competition

By themselves, data on the number of carriers providing each mode of transportation and their size distribution may give a highly distorted picture of the interrelationships within that mode and its ability to sustain competition with other carrier types. On a statistical basis, the railroad industry would be classified as an oligopoly, but we have already seen how their inflexible locations make individual railroads either strong competitors or monopolists rather than oligopolists in relation to each other.

The relatively large size of individual railroads is dictated by the physical requirements of rail operation. Indeed, from a resource utilization standpoint,

[23] Interstate Commerce Commission, 80th Annual Report, 1966, p. 168.

Table 17.–Inland waterway operator statistics, 1956[1] and 1965[2]

Type of carrier	Unit	Firms	Towing vessels	Barges
1956:				
Common carriers	Number	163	716	2,665
Contract carriers	do.	41	95	675
Exempt contract carriers	do.	1,007	2,624	6,176
Private carriers	do.	521	854	4,692
Total	do.	1,732	4,289	14,208
Common carriers	Percent	9.4	16.7	18.8
Contract carriers	do.	2.4	2.2	4.7
Exempt contract carriers	do.	58.1	61.2	43.5
Private carriers	do.	30.1	19.9	33.0
Total	do.	100.0	100.0	100.0
1965:				
All	Number	1,700	3,865	17,085
Regulated by ICC	Percent	8	–	–
Exempt	do.	68	–	–
Private	do.	24	–	–
Total	do.	100	–	–

Note: The information shown for 1956 has not been collected in this way since then.

[1] Hearings before a Subcommittee of the Committee on Interstate and Foreign Commerce, House of Representatives, 84th Cong. 2d Sess. Transportation Policy, p. 1513, Washington, D.C. 1956.
[2] American National Waterways Operators, Inc. Big Load Afloat, p. 60. Washington, D.C. 1956.

Table 18.–Distribution of waterborne intercity domestic ton-miles, by areas of operation and regulatory status, 1964[1]

Area	Total		ICC regulated		Exempt for-hire		Private	
	Ton-miles	*Percent*	*Ton-miles*	*Percent*	*Ton-miles*	*Percent*	*Ton-miles*	*Percent*
Coastal	311.9	63.8	18.9	35.0	97.9	49.2	195.0	82.2
Lake	73.2	15.0	16.9	31.2	37.0	18.6	19.3	8.2
Internal	101.9	20.8	18.2	33.8	63.3	31.8	20.4	8.6
Intraport and local	1.8	0.4	*	*	.9	.4	.9	.4
Total	488.8	100.0	54.0	100.0	199.2	100.0	235.6	100.0
	Percentage distribution by regulatory status							
	Percent							
Coastal		100.0		6.1		31.4		62.5
Lake		100.0		23.1		50.5		26.4
Internal		100.0		17.9		62.1		20.0
Intraport and local		100.0		–		50.0		50.0
Total		100.0		11.0		40.8		48.2

* Less than 0.1 percent.

[1] Totals may not equal sum of items because of rounding. Percentages calculated before rounding.

Source: Department of the Army, Corps of Engineers. Waterborne Commerce of the United States, Calendar Year 1964, Water Carrier Ton-Miles, Supplement 2 to Part 5, National Summary, p. 9.

there are probably too many roads rather than too few—at least so long as each carrier maintains largely independent roadbeds, terminals, and switching facilities in metropolitan areas served jointly. Justification for mergers that are currently being sought by many railroads is usually based on the savings that could be realized by eliminating duplicate facilities and their operating costs. After balancing these claims against potential loss of competition, regulatory authorities have permitted a number of mergers, though usually only where one or both prospective partners were experiencing financial difficulties.

As in the case of rail transport, the territory and type of traffic served by waterborne carriers is determined in large measure by the physical characteristics of the Nation's inland waterway system. This includes the Great Lakes, the Mississippi River and its navigable tributaries, the costal rivers and the intracoastal waterways, and the New York State Barge Canal. Excluding the Great Lakes, there are over 25,000 miles of navigable routes. But these routes do not truly constitute a complete transport system in the same sense that the network of rail lines does.

A single boxcar can move, via interconnecting roads, from any origin on a rail siding to any destination on a siding. No comparable statement can be made for waterway shipments. Some of the most modern equipment is restricted to the Great Lakes and the deepwater channels, and the 10,000 miles with water depths of less than 9 feet are closed to the big barges and tows. Even the most diversified carriers do not offer service on all waterways, and a high proportion of both regulated and bulk carriers limit their operations to the Mississippi River system.

Motor transport, on the other hand, obviously is not subject to comparable physical limitations. Generally speaking, the same truck can move farm products from any origin to any destination the shipper names and can select the most direct route to do so, while providing multiple pickup and delivery service as part of a single haul, if requested. The cost of moving low-value bulk commodities in this way, especially for long distances, would be prohibitive, but the physical capability exists.

This flexibility in meeting the requirements of individual shippers also extends to the carriers' ability to adjust their own operations to broad geographic shifts in demand. Although most truckers who specialize in moving agricultural commodities customarily serve particular regions—sometimes very broad ones—they can vary their routes and territories with seasonal peaks in demand. Carrying capacity can be shifted when and where it is wanted, and can also move away from routes where demand has declined, either seasonally or permanently—often at little or no loss to the truck operators.

Those who question the ability of motor carriers to meet unrestrained rail competition often underestimate the importance of this flexibility (which is an attribute of their great number and relatively small size) as a counterweight to the greater geographic and financial scope of rail carriers. Cutthroat pricing, whereby a larger competitor may attempt to eliminate smaller and more localized rivals one at a time through selective price cutting, for instance, would be largely neutralized by such numerical and geographic flexibility.

Indeed, differences in carrier size and other aspects of industry structure for the major modes of transportation do not, in themselves, provide a convincing argument that the railroads could recapture their old position of predominance if they were free to bid for traffic at whatever rates they chose. The various modes of transportation provide shippers a choice of different services, each of which offers distinct advantages for certain kinds of commodities and over certain distances. Differences among the modes in number, size, and specialization of individual carriers probably have little direct effect on the ability of carriers to compete for the traffic they are best suited to handle.

At the same time, however, these differences in size and scale of operations are associated with other and more fundamental differences in the cost structure of the transportation modes. It is these underlying cost differences rather than those of size which cast serious doubt on the ability of intermodal competition to sustain itself indefinitely if rail rates on farm product shipments were subjected to less regulation without, at the same time making any other changes in the present framework of transportation policy.

The concept that competitive pricing allocates business to the low-cost producer and forces prices to a level which just provides a normal profit is a longrun concept. Shortrun pricing in any industry may reflect the presence either of too much productive capacity to satisfy current demand at prices which just yield operators a normal profit or of too little capacity. Whenever current capacity exceeds the level at which full-cost pricing will generate enough business to utilize capacity fully, any seller in a competitive market is likely to be better off by offering some goods or services somewhat below full cost for some period of time.

All producers have certain costs which would not decline proportionately if output were cut back, and for considerable periods some of these could not be reduced at all. While variable costs would reflect any decline in current production immediately and proportionately, fixed costs have to be met in any case, and producers in competitive markets will generally be better off—for the time being—by maintaining output and sales volume so long as the selling price covers variable costs and contributes toward fixed costs. This is not a profit-maximizing decision but a loss-minimizing one, and any producer who is motivated for this reason to offer goods or services below total cost also has a strong incentive to make longer-run adjustments which will eliminate the need for such prices. Unless producers foresee strong future growth in total market demand for their output, downward adjustments in the industry's productive capacity can be expected over time.

While these generalizations apply to all markets, specific pricing decisions will depend on the cost structure in particular industries and on the ability of competing firms to make adjustments in capacity. The lowest *level* that loss-minimizing prices can reach, relative to total cost, will reflect the relationship of fixed to variable costs; the maximum *duration* of such pricing depends on the time required to lower overhead costs by adjusting capacity downward.

In industries where rival firms have similar cost structures and comparable ability to adjust capacity to changing levels of operation, these variations pose no inherent threat to the process of competitive pricing. Intermodal competition for farm product traffic, however, occurs among carrier types whose characteristics differ radically in both respects. Fixed costs constitute a much higher share of total cost for railroads than for their rivals, a difference among the modes of transportation which is generally recognized. Differences in the duration of time over which fixed costs remain fixed may be even more striking. Both truck and barge operators—particularly the former—can adjust their capacity to the level most effecient for meeting current demands with unusual speed and exactness. In contrast, the persistence of excess capacity has become almost inherent in railroad operation. The significance of these differences and their implications for the competitive pricing of transportation services require careful consideration.[24]

Cost Structure Differences

Relatively heavy overhead costs are usually, though not exclusively, associated with heavy fixed investment. Such investment represents high capital outlays and often depends on long-term borrowing. It also entails many operating and maintenance expenditures which are irreducible so long as operations are maintained at *any* level and others which cannot be reduced in proportion to partial cutbacks in output. Many of these costs associated with fixed investment represent an immediate cash drain at all times; these include property taxes, interest on long-term debt, and the wages of operating personnel whose services are required for any traffic movement, regardless of volume. Others, including some elements of maintenance, may be postponed during slack periods, but such postponements result in deterioration of safety or service and cannot be continued indefinitely. Even failure to earn at least a minimum return on shareholders' investment ultimately makes it difficult—or at least much more expensive—to obtain funds needed for modernization and improvement. Relative to their traffic volume, railroads have a strikingly greater commitment in heavy equipment and facilities than have other modes of transportation.[25]

---

[24] William J. Baumol and associates. The Role of Cost in the Minimum Pricing of Railroad Services. Univ. Chicago Jour. Business XXXV (4): 2-6, Oct. 1962. Also see Baumol and associates. Statement of Clarification. Univ. Chicago Jour. Business XXXVI (3): 348.

[25] Locklin, op. cit., pp. 131-134.

Aggregate balance sheet data for Class I railroads in 1965 (table 19) show that investment in transportation property (net of depreciation) amounted to $25.3 billion as determined by the ICC. This was about two and one-half times as large as the $10.2 billion collected by the same railroads in operating revenues during that year. Long-term debt—that due in more than 1 year—about equaled operating revenues, and the combined total of long-term debt and shareholders' equity (the aggregate capital structure of the railroads) was close to $30 billion—nearly three times gross annual revenues from current operations.

Comparable relationships for truck operators contrast strikingly with the heavy capital outlays required for rail operation. For the same year, Class I intercity motor carriers—carriers of regulated commodities with annual revenues in excess of $1 million—reported aggregate operating revenues in excess of $7 billion. This was almost five times their net investment in transportation equipment (again, as determined by the ICC. Individual truck operators add substantially to their carrying capacity by leasing equipment. The proportion of over-the-road equipment used by Class I and II regulated carriers that is leased rose sharply in the early postwar years to 40 percent of the total and has remained at about that level. This practice allows individual operators flexibility in adjusting their capacity to current demands for service. Class I truckers as a group had an outstanding long-term debt of only 10 percent of the gross revenue generated by current operations, while owners' equity was reported at $1.3 billion—less than 20 percent as much as operating revenue.[26]

Table 19.—Net investment, operating revenue, and capital structure, by carrier type, 1965

Item	Rail[1]	Highway[2]	Waterway[3]
	Million dollars		
Net investment in transportation property. .	25,332	1,500	241
Operating revenue	10,208	7,097	283
Capital structure:			
Long-term debt . . .	10,191	732	116
Shareholders' equity.	19,235	1,325	234
Total	29,426	2,057	350

[1] Class I line-haul railroads and lessor subsidiaries.
[2] Class I intercity motor carriers of property.
[3] Class A and B carriers by inland and costal waterways.

Source: Interstate Commerce Commission, 80th Annual Report, 1966.

Magnitudes shown for carriers on inland and coastal waterways by ICC statistics are probably less meaningful, since only a minor fraction of the for-hire water traffic is handled by carriers whose accounts are reported to the ICC. But the investment ratios computed from the reports of this minority show a relationship intermediate between those reported by rail and highway carriers. In 1965, current operating revenues were slightly larger than net investment in transportation equipment and nearly matched the combined capital represented by long-term debt and shareholders' equity.

Not only do railroads bear the fixed capital expense of an investment that is proportionately much higher than rival carrier types, but even partial utilization of this large fixed capacity entails many maintenance and operating costs that would be associated with its optimum use. Even if the capital cost of the fixed investment were to be written off completely, these expenses could be avoided only by abandoning service entirely, and significantly reduced only by eliminating operations over lightly used sections of line. Truck and barge operators, however, incur very few expenses when their equipment does not move.

While the resulting proportions between those costs which are usually defined as fixed or as variable cannot be quantified exactly, generally accepted orders of magnitude are incorporated into table 20. Where the total average cost for moving a specified class of traffic between points A and B is set equal to 100, variable costs represent the proportion of the outlay associated with moving a single traffic unit that could be saved immediately (or within a very brief period) if that unit did not move; fixed costs are the share that would have to be met whether it moved or not. For railroads, variable costs are estimated to be about two-thirds of the total; for

[26] Interstate Commerce Commission, 80th Ann. Rpt., Fiscal Year Ended June 30, 1966. pp. 159-161; James R. Nelson. Practical Applications of Marginal Cost Pricing in the Public Utility Field. Amer. Econ. Rev. LIII (2) May 1963; Kent T. Healy. Discriminatory and Cost Based Railroad Pricing. Amer. Econ. Rev. XLVII (2): 430-440. May 1957; James C. Nelson. Effects of Public Regulation on Railroad Performance. Amer. Econ. Rev. L(2): 495-505. May 1960; Ford K. Edwards. Application on Market Pricing Factors in the Division of Traffic According to Principles of Economy and Fitness. Amer. Econ. Rev. XLV(2): 621-632. May 1955; and James C. Bonbright. Fully Distributed Costs in Utility Ratemaking. Amer. Econ. Rev. LI(2): 305-312. May 1961.

Table 20.–Costs for service between points A and B, by type of carrier

Costs	Truck		Rail		Barge
	Dol.	*Pct.*	*Dol.*	*Pct.*	*Dol.*
Assuming same total costs:					
Variable (out-of-pocket)	0.90	90	0.65	65	0.95
Fixed (overhead) . .	0.10	10	0.35	35	0.5
Total (fully distributed)	1.00	100	1.00	100	1.00
Assuming total costs are not the same:					
Variable (out-of-pocket)	0.72	90	0.65	65	0.665
Fixed (overhead).	0.08	10	0.35	35	0.035
Total (fully distributed).	0.80	100	1.00	100	0.70

truckers, they rise to as much as 90 percent, and for barge operators they account for perhaps 95 percent of the entire outlay.[27]

Competitive Implications

Table 20 has two hypothetical illustrations, both of which presume that active competition actually exists among all three major carrier types for moving a specified commodity between two specified points. This is, in itself, an important limiting assumption. While rail, truck, and barge carriers all provide transportation services for a wide variety of unmanufactured farm products and compete with each other on a great number of routes, traffic in specific commodities between specific origins and destinations may or may not be the object of active intermodal competition. This depends on many factors, including distance and the physical characteristics of the route itself, availability or absence of backhauls, the amount of the traffic available and its seasonal distribution over time, and such characteristics of each shipment as its bulk-to-value ratio, needs for special handling in transit due to perishability, and the urgency or lack of urgency for speedy delivery. For some commodities and over some routes, the advantage in regard to such factors enjoyed by one of the carrier types may be so great as to preclude active competition.

Even for many shipments that fall within the scope of effective intermodal competition, shippers may have preferences among carrier types. In that case, rates are competitive—not when they are identical, but when the differentials among them reflect what those shippers are willing to pay for the service they prefer. To be "service-equivalent," actual truck costs and rates might be higher than rail costs, but barge rates would ordinarily need to be lower in order to attract traffic. Of the two hypothetical illustrations in table 20, the first assumes that the three carrier types have exactly equivalent total costs on such a service-adjusted basis—that is, their actual costs may vary, but only by the differential that is required for competitive pricing of their services. The lower panel shows cost relationships in a case where both trucks and barges (again on a service-adjusted basis) have lower total costs than the rail carrier.

Under the conditions of cost and rate equivalence shown in the first panel, the traffic might be divided among the competing carriers in any proportion, and if enough traffic were available for all, a $1 rate would permit all carriers to earn a minimum normal profit on that portion of their business and keep a position that reflected actual costs in the industry. Assume, however, as is more realistic, that these carriers—and particularly the railroads—have on hand equipment adequate to handle more than their present share, and that any rate differential would result in diversion to the low bidder of all the traffic he could handle.

Within the framework of these quantitative assumptions, it is possible to demonstrate the impact of cost structure differences on the ability of the various carriers to compete with each other. Since idle capacity entails overhead costs for the railroad equaling 35 percent of the full cost of hauling freight, rail carriers—if free from regulatory restraint—would have an incentive to reduce rates in an effort to capture more traffic. How far would it pay them to cut their charges? Assuming their unit costs remained unchanged within the relevant operating range, it would depend on how much of the traffic they already had and how strongly other carriers were competing for it. If their share in the traffic was already

[27] John R. Meyer, Merton J. Peck, John Stenason, and Charles Zwick. The Economics of Competition in Transportation Industries. p. 145-147, Harvard Univ. Press, 1964; Interstate Commerce Commission. Cost of Transporting Freight by Class I and Class II Motor Carriers of General Commodities by Regions and Territories, Statement No. 7-65; Interstate Commerce Commission. Explanation of Automatic Data Processing Procedure of Rail Form A, Statement 11-63.

considerable and they were sure of retaining it, the amount of revenue that would be lost through extending rate cuts to shippers who were already using rail transport would become an important factor in equation. But in the limiting cases—those in which the railroads either had none of the traffic or where threatened with loss of their entire share—they would stand to improve their position by capturing or holding traffic at any rate above 65 cents. Truck and barge operators should have no incentive to go below 90 and 95 cents, respectively, and could not cover direct operating expenses if they did so.

Even more striking are the relationships revealed in the bottom panel, where barges are shown as the lowest cost carriers at 70 cents and may thus be assumed either to have all the traffic or to be on the verge of taking it, so long as rail and truck rates reflect full costs. Even with a 30-percent cost advantage, however, barge operators could not hold this traffic against determined rail competition and still cover variable costs. With their 95 percent variable cost ratio barge operators could not cut their rate below 66.5 cents in an attempt to hold the traffic, whereas their rail competitors would benefit by taking it at any rate over 65 cents. Trucks also are assumed to have lower total costs than rail carriers (80 cents on a service-adjusted basis) but could not cover direct expenses at any rate below 72 cents.

The differing cost relationships shown in these illustrations suggest that unrestrained rail competition might destroy some and jeopardize the survival of other truck and barge operators, not because they were unable to compete in terms of efficiency and service, but because moving their equipment accounts for almost the full unit cost of providing transportation service, and when equipment does not move they bear almost none.

Regulatory Implications

The prospect that free competitive pricing of transportation services might result in diverting traffic away from the low-cost carrier has caused controversy and confusion in interpreting a key provision of the 1958 amendment to the Interstate Commerce Act.[28] In passing this amendment, Congress recognized that railroads were facing increased intermodal competition and were being hampered in their attempts to meet it by restrictions on rate cutting. The Act, as amended, now specifies that where competitive conditions exist between carriers of different modes of transportation, the ICC is not to keep the rates of one carrier up to a particular level to protect the traffic of another.

The railroads interpret this language as justifying them in holding or acquiring contested traffic at any rate which would leave the railroad in a better financial position. So long as a rate is high enough to cover direct operating costs and make any contribution toward the railroads' fixed costs, rail carriers contend they are entitled to cut rates to that level if necessary to win or hold traffic. They also contend that shippers are entitled to the benefit of such price cuts.[29]

Truck and barge operators counter that price cuts under these circumstances would only temporarily benefit shippers since below-cost rates could not be sustained in the long run; irreparable damage might be done to carriers who were entitled to the traffic on a full-cost basis. According to their presentation to the ICC, this sequence of competitive moves would end in eliminating carriers whose lower costs had brought the downward pressure on rail rates and in reversion by the railroads to monopoly pricing.[30]

Attempts by ICC and the courts to interpret the controversial clause suggest that both arguments are persuasive. Recent decisions reflect the search for a formula that will somehow permit rail carriers to benefit from greater competitive freedom without seriously damaging their competitors.

When the probable outcome of unpolicied intermodal competition is analyzed solely in terms of fixed and variable costs as defined above, the relationships illustrated here suggest that a high degree of caution would be justified in granting ratemaking freedom to the railroads. On their face, these

---

[28] Amendment to Interstate Commerce Act, Transportation Act of 1958, Section 15a (3), Aug. 12, 1958.

[29] Baumol and associates, op. cit. XXXC(4): 9-10. Robert A. Nelson. Interest Conflicts in Transportation. Univ. Chicago Business Jour. XXXVII(2): 167.

[30] Joseph R. Rose. The Role of Cost in the Minimum Pricing of Railroad Services: A Comment. Univ. Chicago Business Jour. XXXVI(3): 336. J. W. Hershey. The Rest of the Story on: The Role of Cost in the Minimum Pricing of Railroad Services. Univ. Chicago Business Jour. XXXVI(3): 338. Romney Robinson. Cost in Minimum Pricing of Railroad Services: A Comment. Univ. Chicago Business Jour. XXXVI(3): 341.

illustrations suggest two adverse probabilities. First, they indicate that traffic attracted by rail carriers under conditions of unrestrained ratemaking might often be misallocated in terms of resource utilization—that is, taken from carriers better qualified to haul it. Second, although such competition would bring lower rates to some shippers, these benefits would be temporary since rail carriers, as successful bidders for the traffic, would be carrying it "at a loss". Unless the carriers clearly foresaw a prospect for raising rates in the future (if rivals were forced to abandon service over the contested routes), it seems reasonable to conclude that they would phase out the unprofitable capacity whose existence had been responsible for their seeking the traffic at rates below the full cost of hauling it.

Certainly, each of these conclusions would apply in the markets for goods or services which are usually used to illustrate broad economic principles of market allocation and pricing. In such markets, competitive pricing ignores overhead costs in the short run because such costs are already inescapable, but shortrun losses are always expected to set in motion processes of longrun adjustment—decisions not to replace some equipment, for instance, or decisions by some suppliers to withdraw from production altogether. Over time, these adjustments are expected to eliminate both the incentive and the capacity which competitors had possessed to offer products or services at less than full cost.

Such expectations, however, can be highly misleading when applied to the transportation industry because the most significant distinction among the rival modes lies in their differing abilities to adjust capacity to demand and in the time it takes to make such adjustments.

Capacity Adjustment Differences

As in the case of fixed and variable costs, certain generalizations about adjustments over time can be applied to all carrier types. While the lower limit of shortrun competitive pricing for any carrier is set by its variable cost of providing services, the capability of moving any traffic at less than full cost depends upon the existence of capacity to handle more business than will be attracted by full-cost pricing. Fixed costs may be thought of as costs associated with an existing level of plant capacity and must be met so long as that capacity exists, while variable costs are those directly linked to current levels of output. Thus, excess capacity is, by definition, a shortrun concept and cannot exist in the long run.

Indeed, this is a truism since the long run is defined as the period long enough for fixed costs to become variable. This means long enough for adjustments to be made in the level of plant and equipment and—unless prospects for future traffic growth warrant their retention—long enough for excess capacity to be phased out of existence. In the limiting case—that in which a carrier was supplying all service at less than full cost—it is presumed that revenue simply would not be available to replace or maintain plant and equipment as this became necessary. In less extreme cases, where losses were confined to particular operations, it is assumed that revenues from profitable traffic would not be used to perpetuate capacity for providing services which did not pay for themselves.

In their ability to carry out such logical adjustments, however, the rail and trucking industries represent opposite extremes. Motor carriers, as has been noted in earlier chapters, can adjust both the amount of their equipment and its geographic distribution among routes served with exceptional speed and precision. For truck operators, not only are fixed costs small as a percentage of total costs, but those which are classified as fixed in the short run do not remain so for long. Barge operators also enjoy these advantages to a considerable degree, although geographic flexibility in using waterway equipment is less than for highway operators.

The railroad industry stands almost at the opposite end of the spectrum. As a practical matter, and for a variety of complex reasons, railroads cannot exercise the theoretical option of bringing capacity into line with current traffic needs. Some of these reasons are related to regulatory constraints; others are inherent in the physical requirements for providing and maintaining the Nation's basic system of rail transportation. At almost all times and in most places, railroads have an underlying capability for handling more traffic than is currently available to be hauled. Since longrun excess capacity is a contradiction in terms, its persistence in the railroad industry may be explained by saying that in railroading, the long run never arrives.[31]

[31] Baumol and associates, op. cit., XXV(4): 4.

Immediate Capacity to Handle Traffic

Capital investment by rail carriers differs from that of rival modes not merely in degree—that is, in the proportion of total costs represented by such investment—but also in kind. Whereas truck and barge investment consists overwhelmingly of transport equipment (tractors, trailers, barges, and towing and cargo vessels), rail investment is a complicated mix of rolling stock, which is roughly equivalent to the acquisitions of other carriers, and permanent plant (rights-of-way, roadbed, terminal, switching, handling and operating and maintenance facilities of all sorts) which have no real counterpart in the relatively modest fixed plant which motor and water carriers need to maintain their operations.

Since truck and waterway equipment comes in readily divisible units, operators can match their equipment to current and anticipated needs. Excess capacity arises either from a temporary miscalculation or from expectations that traffic will grow in the near future. Railroads can exercise somewhat similar judgments in regard to only one portion of their investment: rolling stock. These outlays are conceptually comparable to those of other carriers. The amount acquired or maintained in good repair can be varied over time, and its carrying capacity can be adjusted to changing levels of demand, although such adjustments take longer than for trucks and can never be as precise. Rail management has been criticized for its exercise of judgment in this respect, particularly its tendency to postpone maintenance during recessions, which leads to severe shortages during the next upswing. Recent, new-order expenditures have been heavily concentrated on specialized cars of various types; this has caused shortages of basic boxcars.

Moreover, the status of railroads as common carriers means that they, unlike their rivals, are obliged to accept all the traffic that is offered to them at their published rates. To handle peak seasonal demands, considerably more rolling stock must be maintained than is needed during much of the year. While railroads naturally attempt to minimize the amount of equipment maintained on a year-round basis for use in peak traffic seasons (as shown by delays and freight-car shortages in harvest season), some immediate excess is inevitably available for hauling additional traffic much of the time. And the pool of idle equipment expands sharply during periods of reduced business activity.

The earlier illustration of competitive pricing among carriers with differing cost relationships assumed the availability of some idle equipment. This is generally realistic for the railroads, and its presence gives rail operators a strong incentive to attract off-season traffic at highly competitive rates. But this is neither the only, nor even the most important, excess capacity in the railroad industry.

Underlying Capability for Providing Services

At any given time, the availability of transportation equipment (locomotives, cars, etc.) constitutes a limiting factor on the amount of freight the Nation's railroads can haul, but their underlying capability, represented by fixed investment in plant, greatly exceeds this immediate limitation. Most, if not all, of the components making up this longrun capability are chronically underutilized over most if not all routes. Large increases in the volume of freight being hauled would require additional capital outlays for rolling stock, but if enough increased traffic were foreseen to justify these expenditures, not only could the fixed plant handle this added business, but in doing so, the railroads would be operating nearer their most efficient level. The availability of additional traffic would thus reduce costs per unit for moving all traffic.

Like the portion of the iceberg beneath the waterline, this underlying capability constitutes the most significant form of excess capacity in the railroad system. It could be converted into carrying capacity only through additional outlays on rolling stock. Financing such purchases, unlike other long-term outlays, does not constitute a problem for most railroads since rolling stock is usually financed through equipment trust certificates or conditional sales contracts. Carriers would often acquire such stock if additional traffic could be attracted at any rates high enough to pay for the outlays and variable costs. Even though such rates might not be high enough to contribute their full share to maintain the underlying rail system, more efficient use of that system would represent a net saving to the economy in terms of resources used as well as a financial saving to the railroad.

Conversely, so long as railroads maintain the present geographic scope of their overall operations, cost components which have been defined as

underlying capability cannot truly be adjusted downward in any time period, however long. In this respect, a number of heavy industries come closer to matching the position of the railroads than do the other modes of transportation. For many manufacturers and most utilities, important installations are often indivisible. Output may vary widely as demand expands or contracts, but production will achieve maximum efficiency only at a specific optimum level. Thus, within a wide range and for considerable time periods, the achievement of technical operating efficiency would require an adjustment of output to capacity rather than the reverse, although market conditions may dictate that the firm operate at some less efficient level to achieve the best financial results.[32]

Though this situation is not unique to railroads, it exists for them in an extreme form. If all industries were ranked in order of the physical inflexibility and permanence of the installations which comprise their current operating capacity, railroads would surely be at or very near the head of the list. Moreover, for rail carriers the problem of irreducible minimum capacity is more acute than it is for companies in industries where total demand is growing rapidly. The latter can acquire plant capacity "the next size larger" with confidence that future production will reach efficient levels of operation. Railroads were once in this position but are no longer able to rely on automatic adjustment from the demand side although the volume of freight they haul has continued to increase somewhat on balance.

Effective Capacity

Since the geographic extent of the Nation's rail network was determined generations ago and has not changed much since, it may seem reasonable to suppose that the problem of excess capacity should be declining in importance, at least on an aggregate basis. But this is not the case. In fact, the effective carrying capacity of the rail system continues to increase more rapidly than traffic volume. Such increases are not the result of deliberate decisions to expand capacity as such, but are important byproducts of expenditures undertaken for other purposes.

Technological advances have made possible striking savings in operating costs for railroads which replace obsolete track and facilities, locomotives, and other equipment with newer, more efficient types. Such expenditures are urgently needed if carriers are to offset the impact of rising unit costs for labor and other factors, but the more efficient and automated trackage also mean that existing tracks and yards are capable of handling more traffic and handling it faster.

Furthermore, railroads are under constant competitive pressure to prevent division of traffic to other carriers by improving the quality of their own service. Expenditures undertaken for this purpose also create ability to haul increased quantities of freight. Improvements needed to speed deliveries, tailor service to shippers' needs, and assure better handling include larger and more specialized cars, faster trains, and more automated track, yards, and switching systems. All of these add to the effective capacity of facilities. Because some railroads wish to terminate passenger business, they choose to operate fewer overage trains on less frequent schedules, however inconvenient to the passenger this may be. A similar attitude toward freight shippers would be suicidal.

It appears that the underlying capability of the Nation's railroads to move freight will continue to increase and even to increase rather rapidly, so long as they operate routes approximating existing mileage. The inherent character of railroad operations is such that a relatively high proportion of total costs remain fixed—not only for the present but into the indefinite future.

Cost and Pricing Implications of Excess Rail Capacity

From the standpoint of longrun pricing, two categories of overhead costs should be considered separately: those associated with expenditures that are fixed in the physical sense, such as rights-of-way and highly specialized real property installations, and those which could be curtailed (some of them rather promptly), but only by abandoning service altogether, at least over some routes.

The first category is frequently referred to as "sunk" costs, because they were originally incurred to acquire highly specialized assets with little resale

[32] I. W. Ulrey. The Economic Consequences of Regulated Monopoly Taxation. Unpublished doctoral dissertation, Ohio State Univ., VI, pp. 113-140. 1953.

value for alternative uses which, with normal maintenance, will continue to serve their original purpose more or less indefinitely. Since no significant part of such "sunk" costs can be recovered through immediate liquidation or avoided through failure to provide for replacement, they cease to be relevant in the competitive pricing of any commodity or service.

A considerable share of the original investment in the Nation's railroad system fell into this category of expenditures and much of that total has since been "sunk" in that its cost has been wholly or partly written off through bankruptcy proceedings—mostly as a result of the Depression of the 1930's. Where revenues were adequate to cover the loss directly associated with moving traffic, losses have generally been "cured" by writing down the value of existing investment rather than by geographic curtailment. Since the carriers continued to offer service on about the same scale, this represents a longrun capacity adjustment only if the lower rates which cover costs as computed on the new basis then attract enough traffic to utilize the carrier's physical facilities. More often, such recapitalizations have simply had the effect or renewing the shortrun—under new management where necessary.

Of greater significance, however, in understanding the practical problems of adjusting railroad costs to changes in demand for service are a wide range of expenditures for the operation, maintenance, and even the periodic replacement of equipment needed in providing that service. Generally speaking, these expenses are associated far more closely with the fact of operation than with the level of operation. However lightly utilized a particular line may be, the roadbed must be kept at safe operating standards and facilities and personnel provided to assure adequate traffic controls. Switching, loading, and terminal operations must be activated when needed; however much of the time the facilities and personnel are idle. Even main-line operations involve a great deal of slack, since automated communications and freight-handling systems which permit prompt handling of peak loads often do not lend themselves to low-cost skeleton operation. Moreover, when individual pieces of equipment or essential facilities wear out, the necessity for capital outlays to replace them does not always (or even usually) afford an opportunity to scale capacity downward. As specific replacement needs become urgent it is seldom feasible to acquire equipment specifically adapted to moving a more limited volume of traffic over the same routes. Major downward adjustments in all these costs usually would have to take the form of geographic contraction in the territory directly served by rail routes.

As a practical matter, the option of abandoning service on lines where losses are heavy is rarely open to railroad management. Areas threatened with loss of service resist giving up transportation alternatives although they may have largely discontinued using them except in emergencies. As a broader matter of public policy, there is also pressure to maintain the geographic extent of rail service since the Nation's basic rail system has been vital both to the peacetime operation of the economy and to defense needs.[33]

Moreover, railroads themselves often see little prospect of cutting losses by contracting their physical ability to render service. While many branch lines are underutilized and individually unprofitable, the total volume of freight on main lines is greatly augmented by the traffic from branches. Although technical improvements in trucking have created many situations where it would be more efficient, both financially and in terms of resource utilization, to substitute feeder truck service for branch sidings, the railroads are not, in most cases, allowed to provide this service. By abandoning the branches, independent truck operators would pick up all of this traffic at origin, and much of it might move the entire distance to its destination by highway. Thus the compartmentalization of transport modes makes such abandonment economically unattractive to the railroads even where savings are possible in resource utilization terms.

In light of these complex interrelationships, the tentative decision above against competitive rate-making by railroads needs to be reconsidered. The likelihood that competitive pricing by the railroads might divert some traffic from the "low-cost" carrier for particular hauls has already been demonstrated. But since denial of that traffic to the rail carrier usually will not result in any downward adjustment of rail capacity, it is debatable whether those overhead costs which competitive pricing fails to cover are relevant in determining which of two transport modes is the low-cost carrier for particular hauls in terms of resource utilization. Not only may rate cutting be the sole practical means by which a rail carrier can minimize immediate losses, but because excess

[33] Interstate Commerce Act, National Transportation Policy.

capacity tends to persist indefinitely, rates set on this basis may provide enduring benefits to the carrier, shippers, and the economy as a whole.

Confusion often arises over the relationship of traffic attracted by rate cutting for some freight movements over some routes to traffic provided by the railroad's other shippers. Since all unutilized capacity entails expenses, additional traffic which can be obtained at rates which provide something beyond variable costs helps to meet those expenses and is *loss-reducing* traffic. This runs counter to a natural assumption that any traffic which is carried at a loss must be *loss-producing* traffic. And when railroads offer lower rates to attract freight from hauls where truck, barge, or truck-barge competition is intense, many assume that shippers who provide the railroad with its more profitable traffic are involuntarily subsidizing those whose produce is carried "at a loss".

Actually, so long as the carrier is faced with the problem of utilizing excess capacity, this conclusion reverses the facts. To continue providing service to shippers whose transportation alternatives do not include lower-cost options, the railroads must maintain in operating condition an irreducible basic plant which exceeds what is directly needed to serve those shippers. If the carrier is financially viable (and most, though not all, farm products are carried by lines which are), its shippers in the aggregate must be paying rates which meet the full cost (including overhead) of the service provided. Under these circumstances, any contribution toward overhead costs from traffic that can be attracted only at lower rates reduces the residual cost which must be covered by other shippers and tends to hold down the rates they have to pay. In extreme cases, where the railroad cannot recoup its overhead costs fully from other traffic, the threat of bankruptcy may be lessened.[34]

Thus when the railroads seek regulatory changes which will enable them to improve their position in intermodal competition, the shipping and consuming public has a stake in their success. This is not an absolute stake. The public would by no means benefit from elimination of competition over many routes or from loss of transport alternatives by many shippers who now possess them. But potential advantages are apparent, not only to the rail carriers and those shippers receiving lower rates, but also to the economy as a whole.

[34] Locklin, op. cit., pp. 151-153.

Rail carriers would often be better off financially with additional traffic than without it, even though that traffic could be attracted only at rates which contributed less than their proportionate share to overhead costs. Whether or not a railroad has an incentive to lower a specific rate for a specific freight movement to obtain additional traffic from competing carriers depends, as noted above, on what portion—if any—of this traffic the rail carrier is already moving, and what portion—if any—could be retained without cutting rates to underbid rivals. But where such an incentive exists, the carrier, with little prospect of reducing costs through capacity adjustment, the carriers would continue indefinitely to be better off with this business than without it. Under these circumstances, the minimum rates which carriers were willing to offer to attract such traffic would reflect quite closely the relevant cost to the economy of moving it. Far from constituting a misallocation of traffic, competitive pricing of this sort would result in more efficient use of the Nation's overall transportation system. Indeed, on the basis of this broad calculation of resource use, the application of regulatory constraint to deny contested hauls to rail carriers constitutes a misallocation of traffic from the standpoint of the economy as a whole. Furthermore, shippers who benefited initially from lower charges as a result of such competition would continue to benefit from them so long as competitive pressures, active or potential, were present to forestall rate increases.

Thus, it is the danger that unrestrained ratemaking by railroads might sharply reduce such pressures, rather than the fear that railroads would preempt traffic to which they were not entitled on a cost basis, that gives rise to valid reservations concerning the probable outcome of deregulating rail rates. Proposed solutions to transportation problems must take these dangers into account. But the economic savings that might be achieved by more nearly optimum use of rail capacity warrants closer attention to the prospect that an adequate degree of intermodal competition could withstand less restrained ratemaking by rail carriers. Also, conditions should be identified under which railroads could be allowed to exercise more initiative, without jeopardizing the effectiveness of competitive pressures in some form.[35]

[35] Baumol. op. cit., XXXV(4): 9-10. Also, hearings before the Subcommittee on Surface Transportation, Interstate and Foreign Commerce, 88th Cong., 2d sess., 1958, Problem of the Railroads; and hearings before a Subcommittee on Interstate and Foreign Commence, 84th Cong., 1956.

CHAPTER 6.–THE CHARACTERISTICS OF INTERMODAL COMPETITION

The criteria provided by conventional economic theory for assessing the economic efficiency of market pricing and allocation must often be modified when applied to transportation markets, particularly to those in which intermodal competition exists for some or all traffic. This chapter identifies the ways in which conventional assumptions may be adapted to fit the special circumstances of farm product transportation.

In theoretical economic analysis, markets for goods and services of all sorts have customarily been classified along a spectrum ranging from pure competition at one end to outright monopoly at the other. At these extremes and for a variety of intermediate situations, theoretical techniques have been developed for determining the levels toward which prices and output will tend under various assumptions concerning cost and demand. Transportation markets served by only one carrier type may fit reasonably well within one or another of these conventional models. Traffic which is handled exclusively by motor carriers often moves under conditions which are reasonably close to those postulated for competitive markets, and shippers depending entirely on rail service confront a regulated monopoly (or duopoly) situation, often modified by the presence of potential competition.

But none of these conventional market classifications accurately describe the situation faced by shippers whose traffic is subject to active intermodal competition. And this, as earlier chapters have shown, is the typical situation among shippers of agricultural products. Many specific ways in which markets for transporting these products differ from those defined by such standard categories as pure competition, monopolistic competition, oligopoly, or monopoly have been suggested in the preceding chapters. Conventional techniques of market analysis must be adapted to take these characteristics into account.

The Competitive Model

A convenient starting point for identifying such characteristics is the familiar description, found in any elementary text, of price and output determination in a purely competitive market.[36] In that hypothetical model, it is assumed that buyers (shippers) would purchase increasing quantities of a good (transportation service) as successfully lower prices and, conversely, that sellers (carriers) would offer increasingly larger quantities as prices (rates) rose. Both supply and demand schedules might be expressed graphically as curves, and the actual market price of the service would gravitate toward their intersection. There, the amount sellers (carriers) were willing to supply at a given rate would just equal the amount of traffic shippers were prepared to move at the same rate, and this would represent a shortrun equilibrium position.

If rates and traffic volume at this position either permitted sellers to earn more than a normal profit or forced them to accept less, individual suppliers would be motivated to make additional adjustments over time. In the purely competitive model, all sellers would be small or behave as though they were small, and each would expect to attract all the traffic he could handle at the going rate. When this rate provided excess profits, each would reach an individual decision to expand his output on the basis of his own costs in relation to that rate. New entries also would be attracted into the industry. These incentives would continue to operate until growing capacity and output had forced the volume up and rates down to the point at which they provided only a normal return. Conversely, inadequate profit levels would result, over time, in a contraction of service through reduced capacity.

A longrun equilibrium position would thus be reached at rates which just permitted each carrier to earn an adequate profit when operating at his most efficient level–but did not attract new operators. Once this point had been reached, no incentive for further change on the part of any carrier would exist so long as cost and demand conditions remained unaltered. Service would be supplied in the most efficient manner possible, and rates to shippers would equal carriers' costs (including a normal profit) at their most efficient level of operation. When

[36] Paul A. Samuelson. Economics. Ed. 6, pp. 393-398. McGraw Hill. 1964.

technological changes or economic expansion altered costs or demand, a new process of adjustment would be set in motion.

Most markets fail to conform to these conditions in various ways. In adapting analytical concepts to describe more accurately the specific conditions of farm product transportation, a distinction can be made between such deviations, which are present in most markets, including those usually classified as workably competitive,[37] and those which are either unique to intermodal transportation markets or significantly more important in such markets than in those for goods and services of other types.

The familiar criteria for "pure and perfect" competition demand a homogeneous product supplied to buyers by nearly identical sellers, none of whom behave as though they exert an independent influence on supply or demand. They further postulate both ease of entry and exit for firms in the industry and complete knowledge of other transactions on the part of all market participants. Equilibrium positions approached under actual marketing conditions will nearly always differ from those reached in such a mode simply because any industry, even if it is classified as competitive, will fall short of this definition—usually in a number of ways. This chapter is concerned, not with the presence of such imperfections in transportation markets, but with characteristics which distinctively modify the process through which rival carrier types reach individual price and output decisions dictated by the market and their own cost of providing service in both the short and the long run.

For reasons inherent in the nature of the services they provide and the needs they serve, in the differing engineering technology of the various transport modes, and in the unequal regulatory framework within which carriers operate, intermodal competition is competition among *unlikes*. It can occur only over routes and for types of traffic where these multiple inequalities tend to balance each other out. An analysis which takes into account the distinctive differences among carrier types and defines the specific markets within which their competitive advantages and disadvantages are roughly equated may be called a theory of conglomerate competition. The first step in developing such a theory is to single out characteristics which account for the more important inequalities among the rival modes.

Taking Account of Regulatory Inequalities

One notable inequality is in treatment by regulatory authorities. Earlier chapters showed what differences apply among the major carrier types supplying farm product transportation, and these will not be recapitulated here except to emphasize certain aspects which are relevant for market analysis. Under unregulated market conditions, price and output would be determined through the interaction of supply and demand. Rail rates, on the other hand, are fixed—not in an absolute sense—but they can be changed only through regulatory procedures and only after due notice.[38]

Truck and barge operators can adjust their charges for farm product traffic promptly in accordance with day-to-day market conditions and in light of their knowledge of published rail rates. Rail carriers can respond to market changes only with regulatory approval. This may limit the extent of their response, especially when competitors contest rate proposals, and it imposes some time lag during which competitors can initiate further changes. In markets for farm product transportation, yesterday's traffic moved yesterday, and the specific rate which would have protected or increased the rail share in that movement may not capture today's traffic—let alone tomorrow's.

For purposes of market analysis, the rail rate can be thought of as given; other market participants—both shippers and competitors—are free to make what adjustments they choose. Closely related to this aspect of regulation is that of the railroads' common carrier status which imposes on them the obligation of providing service at the published rate to all traffic offered at that rate. Here again, the known availability of rail service and terms constitutes a given factor to which other market participants can adjust freely.

Taking Account of Cost and Capacity Adjustment Differences

In the context of present regulatory constraints, the higher ratio of variable to total costs for truck and barge operators than for railroads is significant

[37] Richard Caves. Direct Regulation and Market Performance in the American Economy. Amer. Econ. Rev. (5): 172-181. May 1964.

[38] D. Philip Locklin. Economics of Transportation. Ed. 6, p. 314. Irwin, 1966.

chiefly in determining the shortrun competitive response these carriers are likely to make to rate reductions. The much lower rail ratio would have highly important implications for free market pricing by rail carriers if that option were open to them. While regulatory authorities do not usually insist on full-cost pricing by rail carriers in situations where they have lost substantial amounts of business to rivals, neither are the railroads free to offer service on the basis of marginal cost pricing.[39] The lowest rates the Interstate Commerce Commission will consider to be "compensatory" include some elements of overhead costs although not as many as those included in "fully distributed" cost computations.[40]

For longer-run equilibrium analysis, the disparate ability of competing carriers in adjusting their capacity (and costs) to the level of service currently being demanded is crucial. The rapidity with which truck (and to a lesser extent, barge) operators can make such adjustments means that these carriers usually operate at or near their most efficient level. On the other hand, the railroads' capability for hauling additional traffic means that these carriers could usually handle larger volumes at lower rather than higher average costs per ton-mile.[41] Presentations of rate and volume determination in transportation markets must reflect these disparities. The economic efficiency of intermodal competition in allocating traffic among carrier types cannot be evaluated without considering the impact of such differences on resource utilization.

Defining Markets in Which Intermodal Competition Exists

In analyzing competition for traffic among two or more carrier types, a specific and rather limited number of traffic movements should often be defined as making up a separate transportation market. Such restrictive definitions are needed because intermodal competition occurs only when and where specific conditions are met. The high degree of differentiation—not only among the services carriers offer but also among the needs of differing shippers—accounts for some of these conditions, and the unequal impact of distance and other geographic factors upon the cost and service capabilities of each mode account for others. A somewhat similar problem in defining markets exists for any highly differentiated product. But in analyzing intermodal competition, specific traffic movements which are subject to active competition by two or more carrier types must be determined and considered as separate transportation markets.

Establishing Service Equivalence

Broadly speaking, all carrier services are measured in the same basic unit—ton-miles—and substitute for each other. But if the charges of each carrier were identical on a ton-mile basis, most shippers would prefer the service of one or another (most often that of motor carriers) on the basis of speed, convenience, and other service considerations. The rates of two or more carriers are actually competitive, not when they are the same, but when they *differ* by just the premium that shippers attach to the special qualities the preferred carrier is able to offer. This need not pose a problem in theoretical analysis, since in any graphic presentation, the actual rate of one or the other competing carrier may be adjusted up or down by the amount of that differential to bring both rates into line on a service-equivalent basis. But as was pointed out above, service needs and preferences among shippers differ at least as widely as service characteristics among carriers.

Whether a particular shipper finds the services of competing carriers close substitutes or remote ones depends not only on the commodity he is shipping, but also on its destination and sometimes even on the shipping date; the differential he will pay for the service he prefers will vary accordingly. Strictly speaking, any given shipment may be thought of as having its own unique scale of service equivalence. This means that the specific market must be defined quite narrowly. Demand for transportation by shippers of high-value perishable produce cannot be combined in a single demand schedule with that of shippers whose low-value bulk products will not move more than a short distance unless low-cost transport is available. A single market must be confined to traffic for which substitutability among carrier services is roughly comparable.

---

[39] Locklin, op. cit. pp. 310-311.

[40] Interstate Commerce Commission. Explanation of Rail Cost Finding Procedures and Principles Relating to the Use of Costs. Statement 7-63, pp. 1-27 and footnotes to those pages.

[41] Ralph L. Dewey. Criteria for the Establishment of an Optimum Transportation System. Amer. Econ. Rev. XLII(2): 647-649. May 1952. Ivon W. Ulrey. The Economic Consequences of Regulated Monopoly Taxation, pp. 48-70. Unpublished doctoral disseration, Ohio State Univ. 1953.

Even in such a limited context, individual shippers will still have differing preferences, but one service differential may be used in adjusting actual truck rates down or barge rates up to rail rates on a service-equivalent basis. The specific differential chosen to show equivalence in a given market represents an average of the amounts individual shippers in that market would be prepared to pay for their preferences. If actual rates in such a market differed by exactly the amount of the average differential, the division of traffic among carrier types would reflect the sum of individual preferences at those rates. But it seems more probable that traffic would actually move at rates fluctuating around this average. Unlike the railroads, unregulated truck and barge operators are free—subject to general laws against discriminatory pricing—to bargain individually with shippers and need not adhere to published rates. They can attract or reject particular traffic by adjusting specific rates or other terms enough to do so.

Not all traffic movements lend themselves to the construction of such composite demand schedules equating the services of two or more modes. A significant amount of traffic moves from origin to destination only because a single mode can furnish service that makes such movement technically and economically feasible. Metropolitan outlets often could not receive field-ripened fruit of premium quality without express service by truck or even by air, but this is a limiting case. Most shippers would consider substituting alternative carriers on the basis of some meaningful set of rate differentials.

Establishing Cost Equivalence

Intermodal competition occurs only where rival carriers are motivated by their own costs to offer service at or near competitive (service-equivalent) rates. Cost equivalence among carriers occurs not where their costs are equal but where they differ by about the same amount as the difference shippers are prepared to pay in satisfying a service preference. Even after adjustment for the service differential, however, carrier costs may be far enough apart that one mode enjoys a preclusive cost advantage in bidding for particular traffic. Possible competitors cannot afford to offer an equivalent service at service-equivalent rates. Traffic movements of this sort cannot be analyzed in terms of active intermodal competition. Unless the gap between service-adjusted costs for the present supplier and its nearest rival is narrow enough to make the possibility of potential competition significant, the exclusive carrier type is better thought of separately, confronting a separate demand schedule for these services. Rates and traffic volume in markets so defined might be determined competitively or through regulation, depending on the predominant carrier type.

Intermodal competition, as defined here, is limited to freight movements which may in fact move by two or more carrier types. In contending for such traffic, different modes may be thought of as part of the same industry, offering a differentiated service in a single market, meeting one set of shipping needs, and confronting a single demand curve. The transportation industry is not unique in this respect. In any industry where product differentiation exists, the conditions necessary for competition are those in which the relative cost of two or more suppliers permit them to offer their output in the same market at service-equivalent prices.

Identifying Zones of Competition

The unique aspect of transportation as a marketable service, and the one which needs to be emphasized here, is the crucial role played by distance and other geographic factors in determining whether—or more properly, *where*—intermodal competition at service-equivalent rates can occur. Competitive markets cannot be defined in terms of the commodity being shipped. Most agricultural traffic is subject to active intermodal competition over some distances, between some origins and destinations, in some directions, and at some times. Very few commodities move under conditions of intermodal competition over all routes at all times.

This can be illustrated most easily in terms of truck and rail competition since carriers of either type would find it physically possible (though not economically feasible) to provide service between most origins and destinations for most commodities. Introduction of water carriers as additional competitors adds to the complexity of market analysis but does not change the underlying principle.

Broadly speaking, when truck and rail costs are compared on a service-equivalent basis, truck operators generally have an advantage over rail carriers for short hauls while railroads continue to enjoy cost

advantages in handling most long-haul traffic. Extension or improvement in the Nation's highway system increases the distances over which truckers can compete effectively as do technological improvements in motor transport. The historical trend has been in this direction, though such pressures are partly offset by continuing improvement in railroad facilities and equipment. Within any given state of technology and operating efficiency, however, geographic factors draw a line between hauls of a particular commodity which are subject to active or potential intermodal competition and those which are not. The actual location of such lines also depends on regulatory decisions concerning the rates railroads are allowed to offer.

As a first approximation, think of cost equivalence among rival modes as a shifting geographic boundary between short- and long-haul traffic, with intermediate-haul traffic the object of active competition. A set of concentric circles around each origin might even provide a reasonable working model if traffic moved over flat terrain where the routes used by each carrier to the same destination were about equal in distance and equally serviceable under all weather conditions. In reality, of course, farm products move from varying origins to varying destinations over terrain of extreme physical diversity, and the routes used by competing carriers for the same haul may be either direct or circuitous. Such a model also ignores the existence of prevailing traffic patterns which affect both the amount of traffic regularly available over particular routes and the presence or absence of backhauls, whereas carrier costs may depend greatly on both considerations.

Since all modes of transportation are affected by such variations, their relative competitive positions might not be changed if the costs of each were influenced about equally. As a practical matter, however, the impact of specific physical conditions or traffic patterns on different modes is highly unequal and greatly influences ability to compete for particular traffic over particular routes. Hence, zones of competition (competitive markets) must be defined in terms of particular traffic movements rather than geographic areas on a map.

Moreover, these markets must be so defined as to show that a particular shipment might move to any of several alternative destinations. This precludes defining as a separate market the supply and demand for transporting a specific commodity between origin A and destination B. Such a definition would not be meaningful precisely because A and B are necessarily two fixed points a specific distance apart, while distance is one of the component elements in the demand for transportation service. Traffic volume is measured in ton-miles rather than tonnage, and the amount of service offered or demanded at a given rate per mile is a function not only of the quantity shipped at that rate but also of the distance which such shipments move. Either element in the demand for transportation service may vary in response to changes in the rates at which service is offered.

To illustrate the inappropriateness of defining a transportation market in terms of a single origin and destination, suppose that shippers at origin A have been sending their product to destination B. A reduction in freight rates per mile might make it possible for them to take advantage of higher wholesale prices at more distant market C by diverting traffic to that outlet. If this happened, the amount of transportation service being purchased at the new lower rate would increase. But a measure of traffic volume based on movements between A and B would show an absolute decline. Similarly, rate changes might influence the amount of traffic arriving at B from origins other than A. To reflect all possible shifts along the demand curve in response to rate changes, a single market must be defined to include the range of potentially relevant origins and destinations.

The location and extent of competitive zones for transporting any commodity will depend on three sets of factors: 1) the rate differentials needed to provide service equivalence in moving this particular traffic, 2) comparative carrier costs, reflecting the influence of distance and other geographic considerations explained above, and 3) the regulatory conditions and traditional practices which govern rate-making by the principal carrier types. For most commodities, these factors will usually combine to show that one or another of the carrier types enjoys preclusive cost or service advantages over certain routes; they will also determine which hauls, at any given point in time, are the object of active or potential intermodal competition.

Since each such zone is uniquely determined, meaningful observations concerning intermodal competition must be confined to traffic moving over routes, for distances, and at times where it is currently subject to such competition. In this fashion,

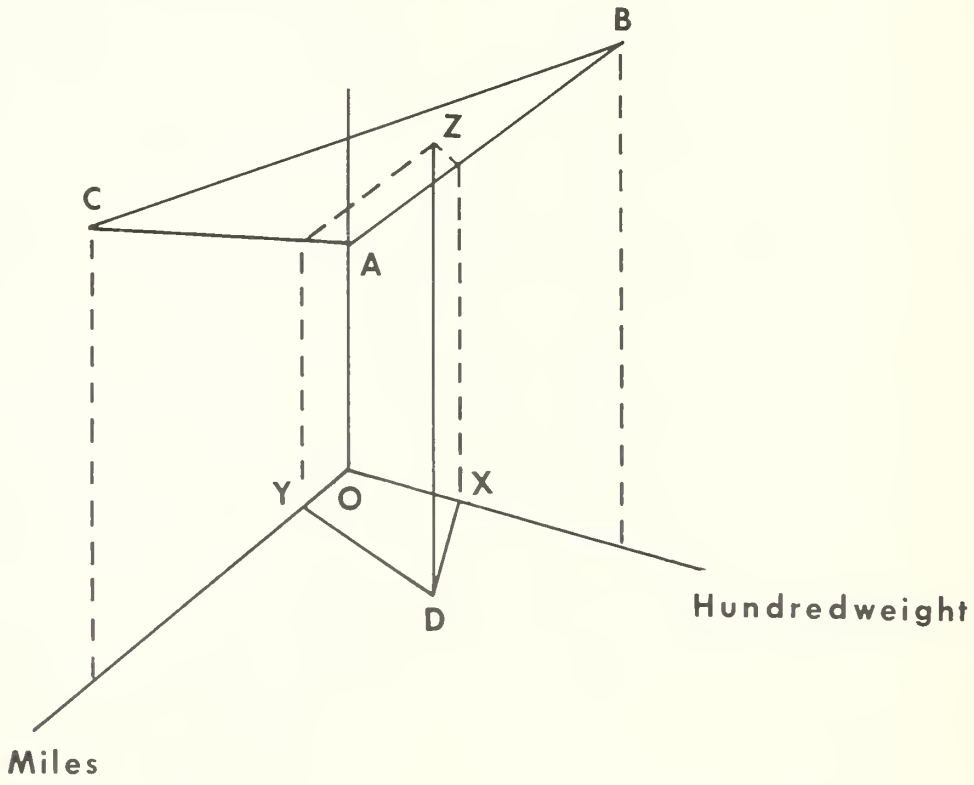
a transportation market can be defined for which theoretical analysis can show how rates and traffic volume will be determined and how traffic will be divided among competing carrier types. In the following chapter, such an analysis (using a simplified truck-rail model) is developed graphically to show the allocation of traffic reached through intermodal competition in a hypothetical market of this type (fig. 1).

Geographic Aspects of Demand Elasticity

Demand elasticity for transportation service differs significantly from that for most goods and services because traffic volume—the total amount of service being demanded—is measured in the compound unit of ton-miles. This means that shippers' response to rate changes may occur through variations in total tonnage shipped, variations in the number of miles these shipments move, or some combination of the two. These multiple-response possibilities are particularly significant in the analysis of demand for farm product transportation since they cast doubt on the frequently made assumption that transportation demand by agricultural shippers is highly inelastic.

That assumption of inelasticity is based on characteristics of agricultural production, discussed in chapter 1, which makes it unlikely that firm output will change significantly in the short run as a result of increases or decreases in transportation charges unless these make up an unusually high percentage of total cost. If a rate change does not produce any sharp cutback or expansion in agricultural output, it cannot be expected to have much impact on the tonnage of farm products moving to market.

Fig.1- RELATIONSHIP BETWEEN WEIGHT OF SHIPMENT, MILES HAULED, AND TRANSPORT COST



But this conclusion must not be translated into the quite different assumption that agricultural demand for transportation service is necessarily inelastic. The marginal transportation decision made by the shipper of farm products concerns not only how much shall be shipped but also how far it shall be shipped. Historically, the importance of this distinction has not always been as great as it is now. Wherever traditional systems of group rail rates were applied, shippers of many commodities (particularly grain) were relieved of the need to make this marginal decision, since rate patterns were explicitly designed to give them a geographic choice among markets regardless of the unequal cost to carriers of providing service to these alternative destinations.

When rate changes occurred within such an arbitrary rate structure, they did not alter the relative cost to an individual producer of shipping his output to either of several markets within the area covered by the group rate. So long as rate changes did not affect the shipper's basis for choosing among market outlets, it was probably true that traffic volume (measured in ton-miles) for products that moved under group rates did not respond proportionately to rate changes.

Wherever intermodal competition has developed, however, arbitrary equalization of freight charges to differing destinations has diminished or disappeared. And once transportation charges reflect the carrier's lower cost for moving traffic from A to B rather than more distant C, producers at A will send their output to market C only if prices there exceed those available at B by more than the difference in transportation charges. Changes in the level of rates charged per ton-mile alter the size of such differentials and thus directly affect shippers' choices among potential destinations. Ton-mile demand for transportation service may be inelastic in regard to some of these changes, but it is likely to be highly elastic in response to others.

In the example above, a uniform reduction in rates per mile would effect a greater dollar saving in the total cost of the longer haul to C than the shorter one to B. Therefore, a price difference in market C which had not been enough to cover the old transportation differential might exceed the new one. If it did, shippers from A would have an incentive to divert traffic to the more profitable market. This diversion would not be halted until prices there were brought down to the point at which they differed from those in B by no more than the new transportation differential. Ignoring any longer-term impact on production and hence on tonnage shipped, the aggregate increase in traffic generated by the rate change would be measured by the additional ton-miles the diverted traffic moved.

Whether such a shift in marketing patterns actually followed a particular rate change would, of course, depend on the wholesale price differentials at alternative markets relative to the amount of the change. Even a substantial reduction might not be significant where transportation charges were small, relative to the market value of the product. On the other hand, the impact of relatively slight changes would be magnified where transportation charges represent a large part of the total price, and such products make up an important part of agricultural traffic. Other things being equal, any significant reduction in freight rates will increase the likelihood that more produce will move more miles to more distant markets, while increased rates will tend to constrict each shipper's marketing perimeter.

For purposes of theoretical analysis of intermodal competition, assume that shippers often respond to moderate shifts of the going rate with a somewhat more than proportional change in *ton-miles* of transportation service demanded. While demand curves are usually drawn as straight lines for convenience, this would not actually be the case. Ton-mile demand would be highly elastic immediately around rates at which the critical comparison between *net* returns available from alternative destinations was likely to trigger a shift in marketing patterns—and quite inelastic elsewhere.

Since most carriers do not serve all the markets to which a given producer may decide to ship his output, potential gains or losses to individual carriers as a result of shifting geographic marketing patterns will usually be much sharper than the net increase or decrease in total ton-miles of transportation service furnished by all. In the above illustration, carriers connecting producing area A with market C might experience a major traffic expansion, but it would be partly at the expense of carriers serving destination B.

Similarly, if freight rates to market C from some other producing area (D) were reduced, producers at origin A who had been marketing produce there might be faced with a loss of this market. As supplies from D began moving into C, prices there would move downward. If they reached a level at which it no longer paid producers in A to sell in market C, carriers moving traffic between A and C would confront a major loss of business unless they granted rate concessions countering those from origin D.[42]

This ricochet competition among carriers of the same or different modes is common and can be at least as effective as direct competition for the same traffic. A familiar example is the competition for fresh fruit and vegetable transportation into east coast metropolitan areas. In this case, carriers serving Florida (both trucks and railroads) compete with carriers (principally railroads) serving producing areas in California and the Southwest. Here again, the effectiveness of competition is enhanced by the fact that each regional grouping of carriers confronts a demand for its service much more elastic than that for all ton-miles of service demanded by shippers in the aggregate for moving fresh fruits and vegetables to east coast points.

CHAPTER 7.–THE DIVISION OF TRAFFIC AMONG CARRIER TYPES

This chapter uses the concepts introduced earlier to show how output and traffic allocation between carrier types are determined by intermodal competition as it now exists, with unequal degrees of regulation for the different carrier types. The equilibrium positions toward which such markets tend over time and the cost relationships which are likely to exist at those positions have already been outlined in chapter 5. But the process through which they are reached can be shown with greater clarity through graphic presentation (fig. 1). By making the modifications described in chapter 6, it becomes possible to apply to traffic moving under intermodal competition an analysis comparable to that used in describing markets of other types, and such a presentation permits a more precise evaluation of intermodal competition against the standards of economic efficiency.

The series of graphs in the following pages (fig. 2 through 7) all represent the supply and demand for transportation of farm products in a single market moving over routes and for distances where active competition currently exists between rail and motor carriers, but not barge operators. Since all shippers ordinarily have some preference between the two carrier types on the basis of service characteristics, the differing actual rates charged by truck and rail carriers for the same hauls must be converted to service equivalence. Because shippers in the same market are assumed to have closely comparable service needs, this can be done by bringing truck rates into line with rail rates through the application of a service differential which equals the average preference among shippers of this particular traffic. Costs (and the supply curves which reflect them) must then be modified to incorporate the same differential so that truck costs will be comparable with truck rates as shown after adjustment. Individual variations in shipper service preferences would still exist around this average; consequently both demand and supply curves are shown as bands, indicating the probability that actual transactions occur throughout a range of individually negotiated charges near the service-equivalent rate.[43]

The customary graphic representation of supply and demand curves for goods and services of all sorts measures price on the vertical axis and output along the horizontal axis. This technique must be modified somewhat to reflect the nature of transportation service, although the concepts are the same. The price of service is shown on the vertical in cents per hundredweight. Output (the quantity of transportation service demanded or offered) is measured

[42] Locklin, op. cit., pp. 186-188.

[43] Although the price of transportation service is referred to as a "rate," it should be recognized that this usage does not conform to customary business practice. The "rates" quoted by carriers to particular shippers are ordinarily stated as the total charge for moving a hundredweight of a specific commodity between a particular pair of origins and destinations; actual "rates" therefore are a complex structure itemizing all possible combinations of origins and destinations for each class of commodities. The term "rate" as used here also encompasses such other terms as special privileges (such as interruptions in service for storage, processing, etc.) which have a value to some shippers and a cost to carriers.

Fig. 2- THEORETICAL SUPPLY OF AND DEMAND FOR TRANSPORT SERVICES IN THE ABSENCE OF REGULATION OF MINIMUM SERVICES

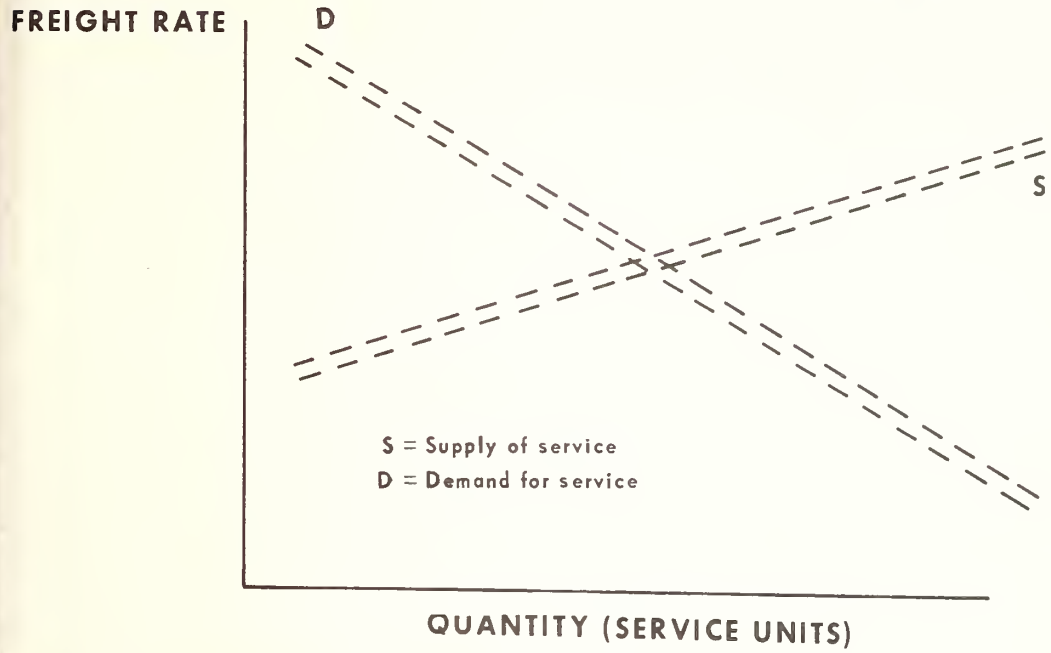


Fig. 3- THEORETICAL SUPPLY OF AND DEMAND FOR COMMON CARRIER TRANSPORT SERVICES WITH MINIMUM RATE REGULATION

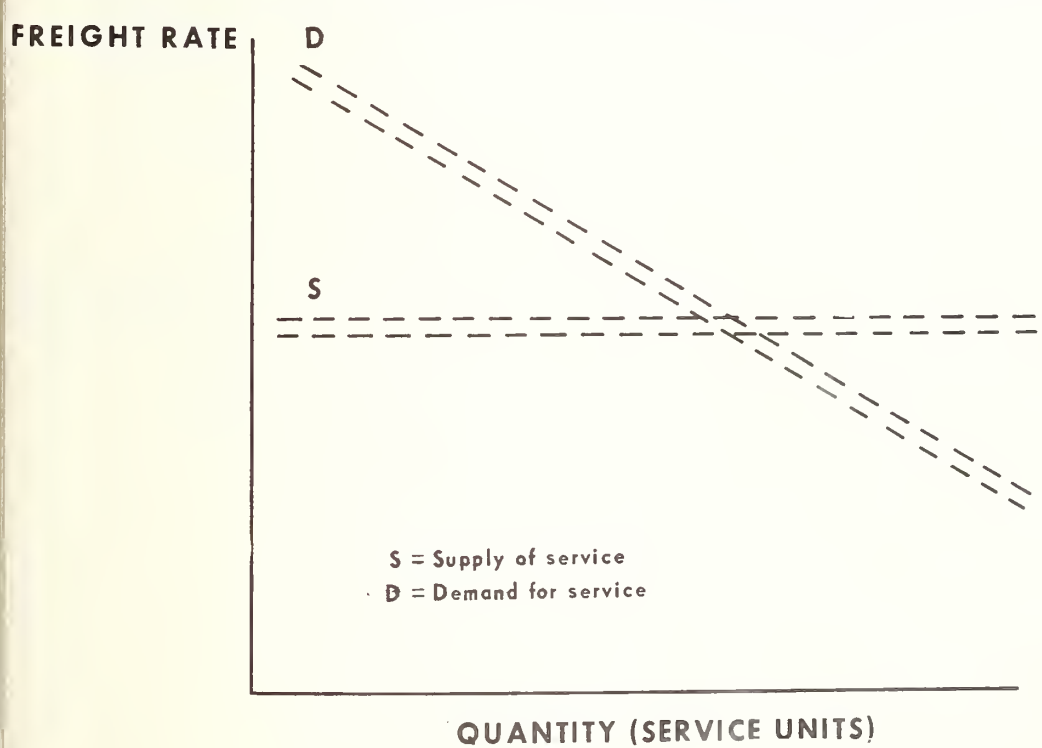


Fig. 4-ILLUSTRATIVE SUPPLY OF AND DEMAND FOR TRANSPORT SERVICES WITH MINIMUM RATES OF TRUCKS UNREGULATED AND MINIMUM RAIL RATES REGULATED

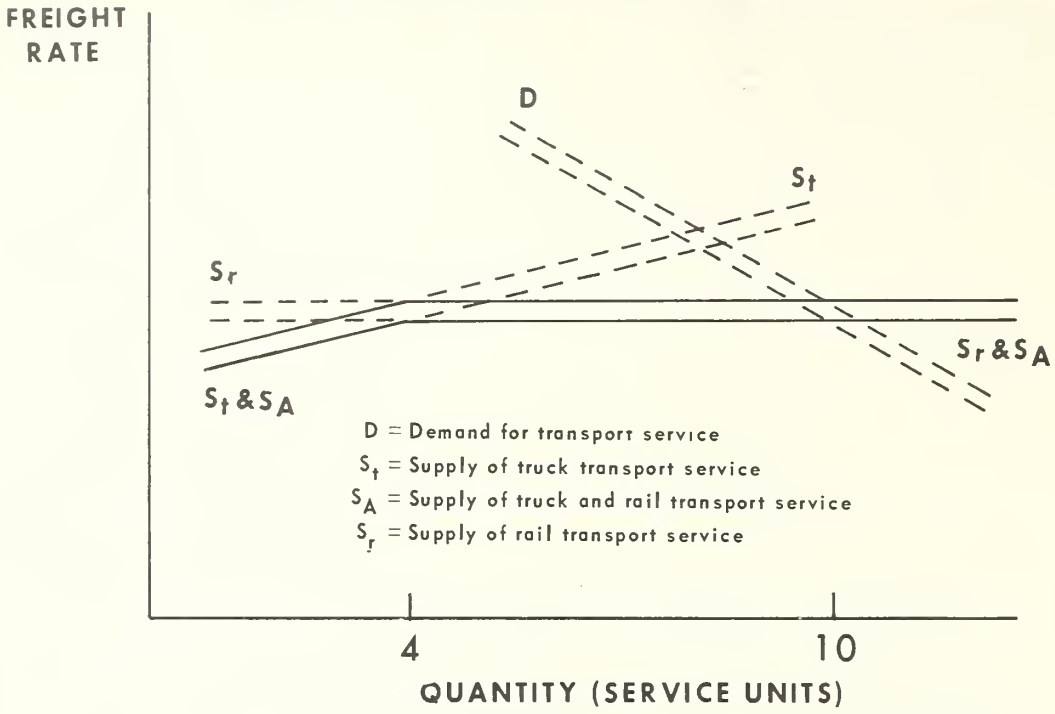


Fig. 5-ILLUSTRATIVE DIVISION OF TRAFFIC BETWEEN TRUCKS AND RAIL WITH MINIMUM UNREGULATED TRUCK RATES AND MINIMUM REGULATED RAIL RATES, NORMAL AND PEAK HARVEST PERIODS

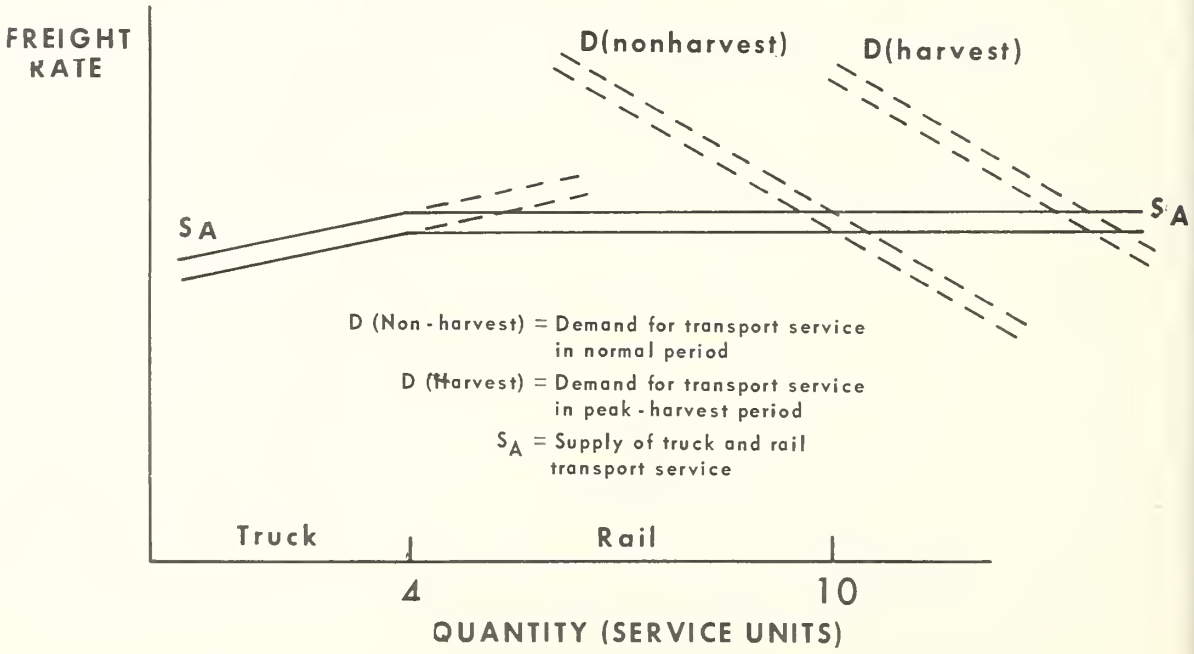


Fig. 6- COST RELATIONSHIPS FOR TRUCKS AND RAILROADS IN A TRANSPORT MARKET

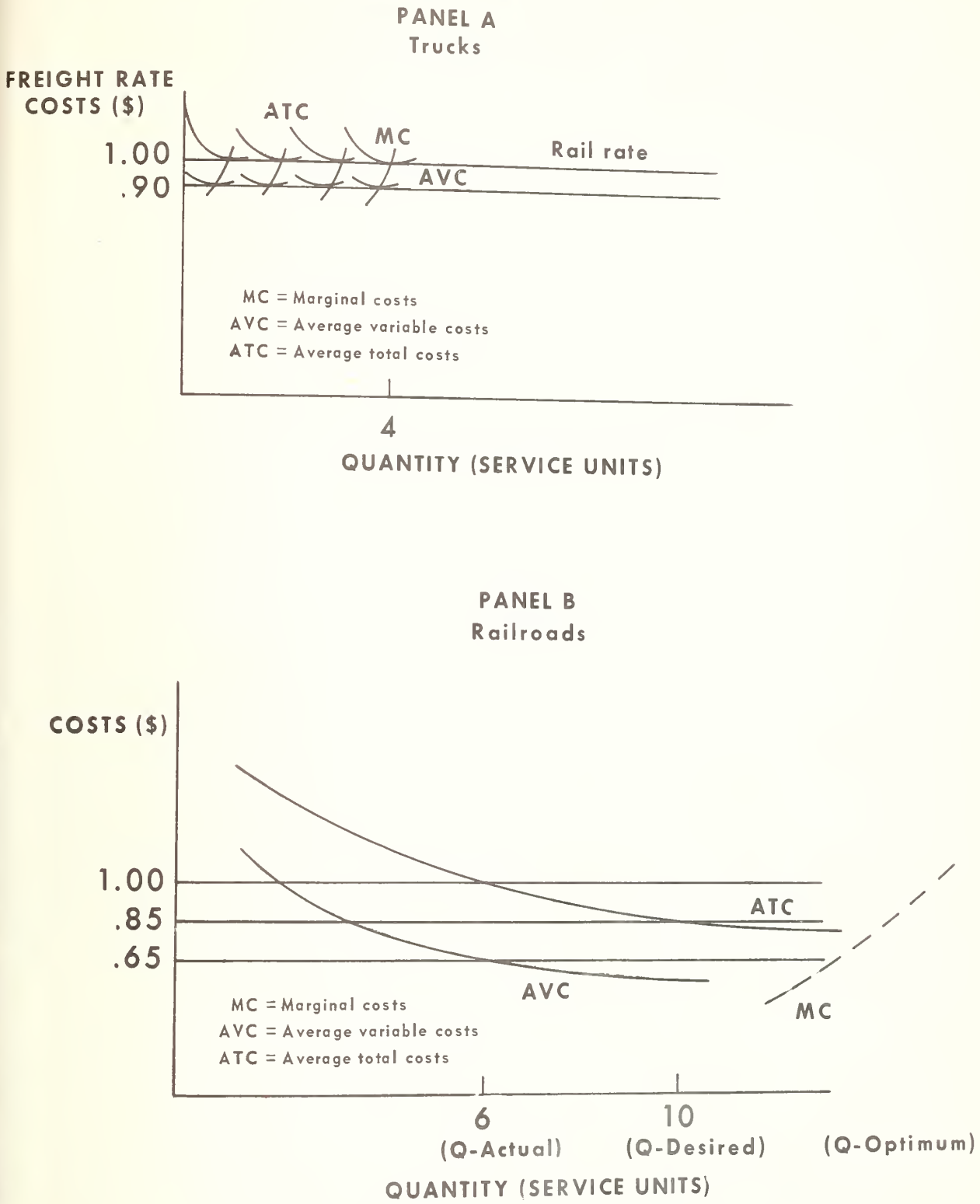
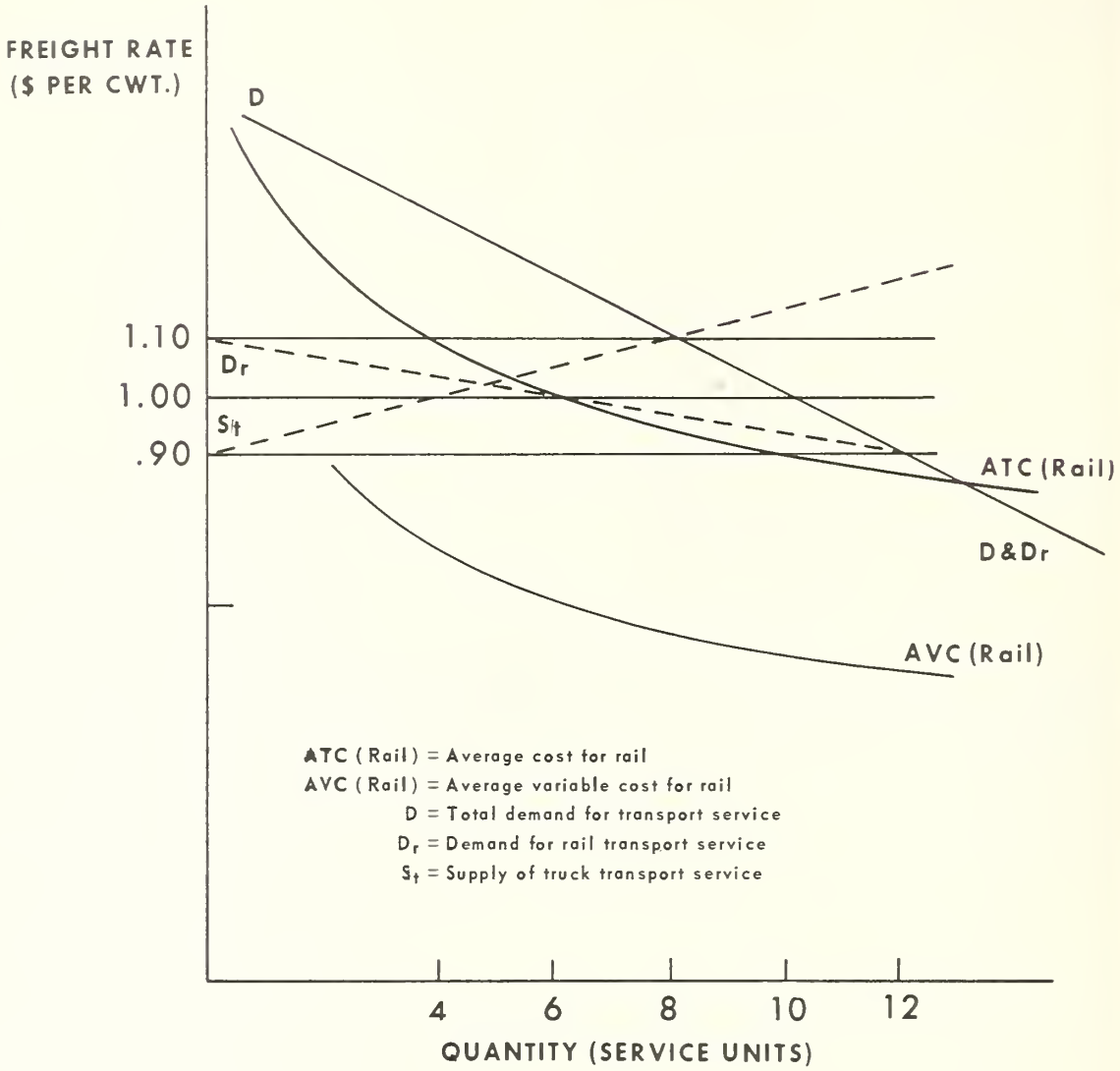


Fig.7- RESIDUAL DEMAND FOR RAIL TRANSPORT SERVICES IN RELATION TO RAIL COST



along the horizontal axis in "service units." This compound measure is employed because the total amount of service being furnished depends on tonnage shipped, distances traveled, and costs associated with varying combinations of these.

Shipper response to a decline in rates for transportation service (a movement *along* the demand curve) can take the form of shipping more of the product, of shipping it for longer distances, or of some combination of the two. Similarly, an increase in the additional service carriers would have to supply at successively higher rates must reflect the fact that an increase in quantity of transportation service may represent additional weight, additional distance, or some combination of these. The addition to the carrier's costs will not necessarily be identical for a traffic increase taking the form of increased weight and one taking the form of increased distance. Since the additional service the carrier will be induced to offer by a given increase in rate will reflect his added cost for providing that service, the additional quantity of transportation (service unit) he offers for increased weight may or may not represent the same proportional increase as the addition of one service unit associated with increased mileage.

A technique for portraying the differing impact on carrier costs of varying weight/distance relationships for particular traffic would entail use of a three-dimensional diagram like figure 1, showing the different costs which may be associated with the same number of hundredweight-miles because of different combinations of weight and mileage (200 pounds carried 100 miles equals 20,000 hundredweight-miles as does 100 pounds carried 200 miles). In this diagram every cost point on the plane (surface)—CAB—represents a unique combination of weight of shipment and length of haul. For example, a combination of OY miles and OX weight of shipment creates a total cost of DZ—Z being the point on the total cost plane (surface) lying directly above D which represents the OY, OX distance-weight combination.

The foregoing modifications in analytic approach reflect characteristics which are inherent in the nature of transportation service; to them must be added modifications required by the differences in regulatory status between motor and rail carriers when moving unprocessed farm products. Before analyzing the division of traffic under existing conditions of unequal regulation, however, it will be helpful to consider the graphic representations (fig. 2 and 3) of market situations which might exist in the absence of regulatory inequalities.

Figure 2 shows the conventional freely competitive determination of price and output in a hypothetical market, not subject to any external regulatory constraints.[44] In this model, both the rate and the amount of transportation supplied would be determined simultaneously within the area of intersection between the supply and demand bands. The supply of service and the division of traffic among carrier types would reflect the amounts of service each carrier would offer at a succession of increasingly higher service-equivalent rates.

The division reached in this way might or might not be compatible with a stable competitive equilibrium which reflected equivalence of total costs or, indeed, with the survival of intermodal competition in that market. Since shortrun supply decisions are based on calculations at the margin—that is, on comparing the additional cost of hauling more traffic with the additional revenue it would bring, rail carriers plagued with excess capacity might be motivated to supply all the service demanded at rates below that which would induce truckers to offer any service at all. Indeed, as has already been explained, the reluctance to free rail rates from regulatory control in markets where there now is active competition from other carriers grows out of fear that market pricing might prove incompatible with the continuance of competition.[45]

Like figure 2, figure 3 presents a hypothetical rather than a realistic market situation. This case, however, is designed to illustrate the determination of rates and quantity of traffic moving in a market where all carriers were subject to the same controls as those now exercised over the railroads. Rates for each carrier and for each type of service would be set and modified only through regulatory procedures. All rates would be published. Service covered by each rate would be precisely defined, and each carrier would have to accept and haul all traffic proffered—at the published rate. Since each carrier could supply no service at other rates, but would stand ready to furnish an indefinite amount at the going rate, supply

[44] Paul A. Samuelson. Economics. Ed. 6, pp. 371-398, McGraw-Hill. 1964.

[45] George Wilson. The Effect of Rate Regulation on Resource Allocation in Transportation. Amer. Econ. Rev. LIV(5): 160-171, May 1964.

by each would be completely elastic at that rate and would be represented by a horizontal line.

Particular traffic would be subject to intermodal competition only if the actual rates approved by the regulatory authorities for each carrier type differed by an amount which brought them within a range of service equivalence. Assuming that such rates have been set in the market represented in figure 3, the separate rail and truck supply curves are merged into a single horizontal band, and total traffic is determined by the intersection of the aggregate demand curve (D) with this band.

In markets where regulation existed primarily to correct monopoly conditions, the rate approved by regulatory authorities presumably would be lower and the resultant traffic volume higher than those which would have been established through unrestrained monopoly pricing. If, on the other hand, the purpose of regulation were to forestall disorderly or cutthroat competition, the established rate might be above that which the market itself would have set, at least for the short run.

In this model, each carrier type would in theory be prepared to meet the total demand for service at the established rate. The division of traffic between them is graphically indeterminate but would reflect the sum of individual shipper preferences at the existing rate differential. If the regulatory authority wished to achieve some particular division of traffic, it might permit selective rate adjustments until a differential was found that accomplished this. Thus, for any specific traffic, both the zone of intermodal competition and the division of traffic within that zone would depend directly on the relationship of the rates approved for each carrier type and only indirectly on the relationship between carrier costs and motivations. The extent to which the division of traffic in such a market reflected cost equivalence (either full or marginal) would depend on the policies governing regulatory ratemaking.

Traffic Allocation Under Conditions of Unequal Regulation

Unlike the two preceding models, figure 4 approximates the regulatory situation under which truck-rail competition for farm product traffic actually occurs. Total demand for transportation service is the same as that shown in the earlier graphs, but the separate and combined supply curves for the two carrier types reflect both the regulation of rail carriers and the competitive freedom possessed by truck operators.

Since the railroad is a common carrier and its published rate at any given time is fixed, the rail supply curve (Sr) is completely elastic at this going rate for the duration of that time. The railroad will haul whatever traffic comes to it at the established rate. How much traffic will come, if any, depends in part on the amount of transportation service shippers will demand at that rate; this amount is shown by the aggregate demand curve (D). But it depends also, and more importantly, on the way in which truck costs are related to the rail rate. These determine the amount of service that truck operators will choose to supply. In any given transportation market, intermodal competition will not occur unless truck costs are roughly equivalent to the going rail rate. If they are higher, truck operators will leave the traffic to the railroads. If they are significantly lower, enough additional truck capacity will be attracted to this market to preempt it entirely.

Figure 4 represents a market in which the relationship between truck costs and rail rates does permit a division of traffic between the two carrier types. The separate supply curve for truck operators begins at a point below the going rail rate, indicating that some truckers would haul some of the traffic moving in this market at rates below those charged by the railroad—if this were necessary to obtain this business. Since motor carriers would be induced to seek increasing amounts of the traffic at successively higher rates, their supply curve for furnishing service has the conventional upward slope, and the primary condition of intermodal competition requires it to intersect the separate rail supply curve (Sr) at any point to the left of total traffic (shown here as 10 service units) determined by the intersection of D and Sr.

If the total demand for service were more limited, truck operators might have the capability and incentive to handle all available traffic. Under these circumstances, the effective rate would be set by the truckers in competition with each other below that established for the railroad, and the separate truck supply curve (St) would be the effective supply curve for the entire market. The separate rail supply curve lying above it would be irrelevant. But so long as more traffic will move at the established rail rate than truckers are prepared to haul for that rate, the rail rate is the effective one. The portion of the truck

supply curve lying above the rail rate is irrelevant, since shippers can obtain rail service without paying more than the rail rate. Total traffic volume is determined by the intersection of the aggregate demand curve (D) with the horizontal rail supply curve.

In a market where traffic is divided between carrier types, the aggregate supply curve (S_A) is a single kinked band combining at service-equivalent rates the relevant portions of each separate supply curve. The division of traffic between carrier types is determined by the point at which these separate supply curves join in relation to total demand for services. While the going rail rate is assumed to be effective for the entire market, truckers are actually free to bargain individually with shippers when this is necessary to obtain business that might otherwise be lost. Since all except the marginal trucker would be prepared to take a little less than the rail rate rather than lose the traffic, it must be presumed that truckers do, in fact, move all the traffic lying to the left of the junction between St and Sr. In figure 4, this is shown as four service units.

After truckers have provided as much service as they are motivated to offer at the rail rate, whatever demand remains unsatisfied at that rate becomes available to the railroads. In figure 4, this difference between the total amount of service demanded at the going rate and the amount provided by trucks is shown as six units of traffic. So long as both shippers and competing carriers make their decisions on the basis of a given rail rate, the determination of rail traffic is outside the carrier's control, and the railroad is relegated to the position of a residual carrier.[46]

The rail supply curve is completely elastic at the going rate in the short run as a result of its common carrier requirements, but the slope of the truck supply curve depends on the financial capabilities and decisions of large numbers of small operators. In most markets for farm product transportation where truckers are currently handling part of the traffic, their willingness and ability to supply more or less service is probably quite elastic around this going rate. That is, small percentage increases in the rate would be likely to attract larger percentage increases in truck service offered, while moderate declines would result in disproportionate withdrawals of service.

This presumption, which is reflected in the slope of St as drawn in figure 4, is based on the characteristics of the trucking industry. Motor transportation of farm products, as explained in earlier chapters, generally meet the criteria for pure competition. In such a market, similar producers acquire their production factors at similar prices, must operate with comparable efficiency, and so are assumed to have nearly identical costs. These conditions apply reasonably well to this segment of the trucking business. Moderate initial need for capital combined with the lack of certification requirements permit easy entry and exit. Since notable economies of scale do not exist, many small operators can compete successfully.[47] Nor do the elements which make up operating expense afford individual managers as wide latitude for variations in efficiency as exists in many industries. Cost differences between the most efficient carrier and the marginal trucker are likely to be relatively small.

A general expansion in the aggregate amount of trucking service being provided to all shippers by all truckers would be bound to exert some upward pressure on the costs of all operators. But the potential magnitude of traffic expansion or contraction involved in a single transportation market, as defined here, would have only a limited impact. Thus it seems reasonable to assume, as is done in figure 4, that a regulated rail rate only moderately higher than that shown would attract a greatly expanded amount of service from truck operators and might well preclude rail participation in this particular market. Conversely, an established rail rate only moderately below that which produces the four-to-six division of traffic might exclude truck competiton altogether.

Significance of Common Carrier Obligations

Carrier responses to these two possibilities would not be symmetrical since truckers would simply cease providing service if rates no longer attracted them, whereas railroads—as common carriers—would remain obligated to offer immediate service, even though it was not in fact being demanded at the established

[46] David Alexander and Leon N. Moses. Competition Under Uneven Regulations. Amer. Econ. Rev. LIII (2): 466-473, May 1963.

[47] Merrill J. Roberts. Some Aspects of Motor Carrier Costs: Firm Size, Efficiency and Financial Health. Land Econ., Vol. 32, Feb. 1956.

rate. Although relegated to a standby position, the common carrier must be prepared to furnish a service which shippers utilize only for overflow traffic at peak seasons or when weather conditions cut into the capabilities of other carriers.

Figure 5 illustrates the potential burden this imposes on rail carriers in terms of the extreme fluctuation in traffic associated with harvest movements. At such times the demand for transportation service increases sharply (a shift to the right of the entire demand curve) and is shown here as D(harvest). But the increase is recognized by carriers as temporary, and truck operators are not motivated to make longrun adjustments in capacity to satisfy it. Except to the limited extent that they chose to work existing equipment more intensively or divert equipment from routes where traffic may be slack, the entire temporary increase in traffic, shown here as all traffic over 10 service units, will become an obligation of the railroad. To meet this demand, rail carriers must maintain at least the minimal rolling stock to move it at the going rate, even though some equipment stands idle the rest of the year.

The Economic Efficiency of Intermodal Traffic Allocation

The distinctive characteristics of intermodal competition, as illustrated in figures 4 and 5, is that market equilibrium is reached through adjustment on the part of shippers and motor carriers to an established rail rate which can be altered only after publication, negotiation, and delay. This process may prevent the rail carrier from choosing an advantageous rate in terms of its own financial interest. But this is only one factor in assessing the current operation of intermodal competition for farm product traffic. It is still possible that the division of traffic between carrier types reached in this way is the best that can be obtained from the standpoint of shippers generally, and the economy as a whole. Critics of intermodal competition under present conditions of unequal regulation question whether it is the best.

Some of their questions grow out of the dynamic aspects of transportation technology. Both the needs of farm shippers and the technological possibilities for meeting them are subject to rapid changes. Regulatory constraints over rail rates and services introduce elements of rigidity which may conflict with incentives to innovate and with flexibility in adjusting to change. Doubts on this score are highly significant and will be considered qualitatively in the final chapters, but they do not lend themselves to demonstration or disproof through graphic analysis.

Such techniques can, however, be used to explore the economic efficiency of traffic allocation among competitors with cost structures as different as those of rail and motor carriers. Does a market process in which the amount of traffic being moved and its distribution among carrier types are determined by the way other market participants adjust to an established rail rate lead to a stable equilibrium position? Will each carrier, when in equilibrium, be operating as efficiently as possible and furnishing service at the lowest rate consistent with normal profit? And will traffic then be allocated to carriers able to move it at the lowest cost in terms of resources used?

Panels A and B in figure 6 provide the bases for reaching separate answers to the first and second of these questions for truck and rail operators respectively. In each of these panels, the cost relationships used in chapter 5 are applied to the model of traffic determination developed in figure 4. The given rail rate is assumed to be $1 with the actual truck rate adjusted to this on a service-equivalent basis. On this adjusted basis, variable costs for the marginal motor carriers amount to 90 cents whereas railroads, when operting in the range relevant to the $1 rate, are assumed to have variable costs of 65 cents.

Equilibrium Position for Truck Operators

As in figure 4, the motor carriers' share of the market consists of four service units, and panel A of figure 6 shows individual families of cost curves for each of the small operators who combine to supply this amount of service. Sets of three cost curves are shown for each carrier—average total cost (ATC), average variable cost (AVC), and marginal cost (MC). The location of each family of curves along the horizontal axis represents a cumulation of the service provided by that carrier and those shown to his left until the four units provided by truckers in the aggregate have been reached.

These families of curves are shown as being indentical, but each is probably unique, due to differences among truckers in age of equipment, preferences for shorter hauls, etc. Within the limited

range of service volumes represented by a single transportation market, it is assumed that truck operators have identical costs and that, within this range, additional service could be supplied at about the same cost. Taken together, these curves reveal an equilibrium truck position in which each carrier is supplying service at the lowest rate consistent with normal profits, while operating as efficiently as possible.

As in any unregulated market situation, each operator seeks traffic in the short run up to the point at which the added cost of handling it just balances the additional revenue it brings. And, since none expects the going rate to be influenced by his decision, each will offer service up to the point at which his marginal costs equal that rate. The shortrun supply curve for the trucking industry in this market is, therefore, the sum of these individual marginal cost curves.

But the four units of traffic established in figure 4 as the aggregate amount of service supplied by motor carriers would not constitute a longrun equilibrium position if a division of traffic which brought them four units either permitted truckers to enjoy more than normal profits or forced them to accept less. Motor transport of unprocessed farm products is an open-entry, competitive industry, and excess profits would attract more operators into the market while inadequate profits would force some to leave. Since the average total cost curve incorporates a "normal" profit by definition, failure to earn an acceptable return would be shown graphically as a failure to cover average total costs and would result in downward adjustments of truck capacity either through diversion of existing equipment or failure to make replacements. In the short run, the average variable cost curve is significant because it provides a lower limit to the rate range within which truckers, confronted with falling prices, would continue for a limited time to compete for traffic; when rates fail to cover more than variable costs, an immediate shutdown point is reached.

Unless the $1 rate is thought of as having been established so recently that adjustments are still in process, the aggregate decision of motor carriers to haul four units of traffic indicates that truck operators are providing the service for an average total cost of $1, including a minimum acceptable profit and assuming that each trucker is forced by competition to operate at his most efficient level.

For this generalization to be completely descriptive of an actual market, truck transportation of farm products would have to conform completely to the criteria for pure competition. In practice, of course, these conditions are only approximated. Truck costs are not entirely uniform. Some operators are more efficient than others, and the least efficient or marginal trucker may be the only operator who is barely surviving at the $1 rate. Moreover, despite the ease with which capital can enter or leave the trucking industry, the amounts of "minimum acceptable profit" incorporated into each individual cost curve should not be thought of as identical for all operators. Farm product transportation is one segment of American industry in which self-employment is a viable alternative. For those seeking self-employment, investment in trucking equipment may be thought of as an entry fee more than a pursuit of the highest possible return on each dollar invested. Since individual valuations of self-employment differ, this introduces another element of variability into the presumed uniformity of trucking costs.

But even when allowances are made for some deviation from the model, figure 6A broadly represents the trucking industry's substantial ability to make an optimum adjustment to any given transportation rate. In the short run, the amount of service offered will be adjusted to existing capacity, and over a slightly longer period of time, capacity will adjust itself to the optimum level of operation.

Equilibrium Position for a Rail Carrier

So long as the going rail rate is in effect, reactions by shippers and competing carriers will impose on the railroad a level of operations which it must accept as given. Without being free to attract (or reject) traffic by rate variations, it cannot adjust output to capacity. But for reasons explained in chapter 5, much of the railroads' indivisible underlying capability cannot be adjusted to a given level of output and, due to the obligations of common carriers, it has only limited scope for adjusting even its immediate capacity in the form of usable rolling stock.

The graphic representation of rail costs—shown in panel 6b—reflects a much more limited concept of equilibrium than that shown for truck carriers in panel A. The six service units of traffic which come to the railroads at the $1 rate and the costs associated with a six-unit operating level constitute a situation

that the rail carrier may not be able to act independently to improve. It can initiate proceedings which may lead, over time, to a rate change. The cost and rate relationships shown in panel B have been selected in such a way that the going rate covers total costs for the six units of transportation service demanded at that rate. Therefore the carrier can continue indefinitely providing the current amount of service at the current rate.

It should be stressed that this is an operational rather than a normative concept. The "minimum normal profit" incorporated in conventional cost curves carries a connotation of being fair, reasonable, or "right" only when capital is assumed to be mobile. Where mobility exists, returns must be comparable to those available from alternative investments, or the capital needed to maintain capabity at current levels would, over time, move elsewhere. But capital invested in the railroad industry is, to a large extent, captive capital, and the plant which requires recurrent maintenance outlays is largely indivisible. Debt coverage ratios and returns on shareholders' equity may be less than those prevailing in industries with substantial mobility of capital.

Nevertheless, and with this important reservation, it is possible to say that the revenues of individual truck operators portrayed in panel 6A and those of the rail carrier in panel B are both shown as adequate to maintain supplies of service at the current level and no more. In this very limited sense, the rail carrier's position, like that of the truck operators, is one of longrun equilibrium.

Here the similarity ends. The marginal trucker in equilibrium adjustment is operating at his most efficient level and, in fact, can survive only by doing so. In an industry without notable economies of scale, it must be presumed that the cost to truckers of handling more traffic than their present share would tend to rise; certainly average costs could not be lower if more traffic were being moved. At six service units, however, the railroad is operating at less than its most efficient level. The present of excess capacity in the railroad industry depends on the total level of rail operation in all transportation markets. Track and related facilities (underlying capability) exceed requirements for this level, and as the average variable cost curve in panel B shows, the illustration assumes current operations are far enough short of utilizing capacity that elements of variable cost—including personnel—would also be more efficiently employed if more traffic were available to be handled. This degree of underutilization probably does not exist over all routes at all times but is sufficiently prevalent throughout much of the rail system to warrant the assumption used in this illustration. Thus, if the rail carrier could attract a larger traffic share, average total costs and even average variable costs would be lower.

Whereas the going rate of $1 just covers average total costs for six units of traffic (Q-Actual), the rail carrier would—under the cost assumptions used here—improve operating efficiency enough to cover total costs at 85 cents if he could attract, in addition, the four units of traffic currently being handled by trucks. This 10-unit total is plotted on figure 6 as Q-Desired. The magnitudes used in this illustration are arbitrary and may exaggerate the extent to which efficiency would be improved by attracting additional traffic within a single market defined as narrowly as that considered here.

The limited extent of this market is indicated by showing that average total and average variable costs would both continue to decline beyond Q-Desired until a true optimum was reached. As for any producer, this point is indicated graphically where the marginal cost curve intersects the average cost curve and average total costs turn upward. In figure 6B, it is shown as Q-Optimum, lying indefinitely to the right of any traffic expansion which could be expected to result from providing increased service in the market considered here.

The small fraction of the railroad's total business represented by this single market also influences the shape of the average total cost curve for extremely small amounts of service. If the graph represented total rail traffic, average total costs for handling very small amounts of business would be shown to be extremely high, since all overhead would be charged against these few service units.

Panel B shows that loss of traffic moving in this single market and not affecting other traffic moving in other markets would result in only moderately higher average costs to the railroad. Conversely, of course, loss by the railroad of traffic in other markets would have an adverse impact on the costs presented here while traffic gains elsewhere would improve operating efficiency and lower the cost of carrying this traffic. While factors outside the specific market represented in this figure are held constant for this

analysis, such relationships emphasize the sensitivity of rail costs to traffic volume.

These observations point up a vital distinction between the equilibrium position for truck operators shown in figure 6, panel A, and that representing the rail carrier in panel B. The particular cost-rate relationship shown as an equilibrium position in panel B is not graphically determinate in the same sense as that presented in panel A; it is, instead, the specific result of a rate set at $1, which happens—under the assumptions used here—to generate six units of rail traffic. Once truckers have completely adjusted their market participation to any going rate, the cost relationships shown in 6A will hold for any market in which it pays them to haul any traffic. This is the position toward which their adjustments tend, whatever the rate level. For railroads, on the other hand, actual costs will reach their lowest level—that associated with the most efficient level of operations—only if sufficient traffic comes to them at the going rate to permit maximum efficiency. Moreover, the rate actually set and the amount of rail traffic it generates will determine whether the rail carrier is operating at a profit or a loss.

Rate Determination and Traffic Allocation

Figure 4 showed how the division of traffic between truck and rail carriers at any given rail rate was determined by shippers and motor carriers in response to that rate. Panel B in figure 6 showed the relationship between rail costs and revenues which would follow from one particular division of traffic in response to one particular rate under one assumed set of cost conditions. In both graphs, the rate which determined this result was taken as given. In actual market situations, of course, it is subject to negotiation between railroads and regulatory authorities and is set in the hope of realizing a number of policy objectives—not all of which may be mutually compatible or attainable.

Among these, this chapter is concerned principally with the degree to which the ratemaking process for railroads promotes overall economic efficiency. To maximize economic efficiency, three conditions must be met. First, rail rates in the aggregate (although not necessarily in single markets) must enable the carrier to cover variable costs, at least. Second, all carriers should operate as efficiently as possible. And third, total traffic should be allocated among carrier types in such proportions that—after making the appropriate allowance for service differentials—each unit is being moved by the carrier able to do so at lowest cost in terms of resource utilization.[48]

Consider the equilibrium positions associated with the $1 regulated rate in figure 6 in light of these criteria. Given the cost and demand conditions assumed here, this rate satisfies the first condition directly; it is sufficient to cover all costs allocated to the six units of traffic moving by rail at that rate, although it does so only because favorable assumptions concerning costs and levels of traffic were chosen in setting up the illustration. The second condition is being met by truckers, but not by the railroads which would operate more efficiently with successive additions to its traffic. The third condition—equality of costs between rail and truck carriers—is satisfied in the formal sense when 10 units of traffic are shared six-to-four, but the equality is illusory. It occurs at that point only because rail costs are higher at that point than they would be if more traffic were being hauled by rail.

With other cost and demand assumptions, traffic allocation—in terms of overall economic efficiency—might appear even less satisfactory. In many transportation markets, for instance, attempts to assure adequate rail earnings by setting charges for all specific freight movements at levels which cover the cost of handling those movements tend to be self-defeating. Even where enough traffic comes to the rail carrier at such a rate to provide adequate revenue, "full-cost pricing" tends to prevent realization of the second and third goals because the cost computations used in justifying the rate set are necessarily based on actual operating expenses at existing or recent levels of traffic and thus reflect the inefficiency and economic waste associated with underutilized rail capacity. When rates are set high enough to cover costs calculated on the basis of past experience at less than optimum operating levels, they are higher than would be needed to cover unit costs for freight handled in larger quantity. But setting rates at levels whose adequacy is determined by such experience may often preclude the expansion which would justify their being lowered.

Figure 7 illustrates these complex interrelationships by showing a range of rail traffic and cost

[48] James C. Nelson. Effects of Public Regulation on Railroad Performance. Amer. Econ. Rev. L(2): 495-505, May 1960.

positions which would be reached under alternative rate-setting policies. The underlying cost and demand assumptions are the same as those in the previous figures. The total demand curve (D) is the same as that shown in figure 4, and the supply curve for motor carriers is the sum of the marginal cost curves of the individual truckers actually serving this market or prepared to do so at successively higher rates. This curve (St) shows what amounts of service motor carriers would choose to supply within a relevant range of rates. Below 90 cents, none would have even a short run incentive to compete; from 90 cents to $1, short run competition for some service would exist although inadequate returns would induce truck operators to curtail service in the longer run. Above $1, long run incentives to supply increasing amounts of service would operate, and at $1.10 truckers would be offering eight units of service. Since eight units would fully satisfy shippers' demands at that rate, motor carriers would then preempt the market.

For each intervening rate, the residual demand for service available to the rail carrier can be computed as the horizontal difference between the truck supply curve (St) and the total demand curve (D). The separate demand schedule for rail service derived in this way was plotted as (Dr). Since motor carriers would immediately cease offering service if rates fell to 90 cents or lower, the separate rail demand curve rejoins (D) at that point.

With the rail demand curve (Dr) plotted separately, it becomes possible to read directly from figure 7 the amounts of traffic that would actually become available to the rail carrier at each rate between $1.10 and 90 cents and to compare rail costs at each of these traffic levels with the revenue received at that level. A $1 rate, as already noted, would generate six units of traffic, and these could be handled at an average total cost of $1. At higher rates, less traffic would be come available, average costs would rise more than average revenue, and the reduced amount of traffic would be handled at a loss. The carrier, however, would be better off with this traffic than without it so long as variable costs were more than covered. The portion of the graph to the left of the point at which Dr intersects the $1 rate thus demonstrates the futility for railroads of attempting to overcome operating losses by seeking higher rates.

On the other hand, increases in rail traffic are shown as progressively reducing the carrier's average cost for handling each unit. Given the particular cost assumptions used, the decline would actually outpace rate reductions throughout the entire range of intermodal competition. At 90 cents, truck carriers with variable costs of 90 cents would cease—even in the short run—to seek the contested traffic, and the rail carrier would supply the entire demand. The total amount of service demanded would have risen from 10 to 12 units as rates declined, and this traffic increase would be added to the four units diverted from motor carriers. The 10-cent rate reduction would double the amount of traffic becoming available to the rail carrier in this market. An increase of this magnitude would be expected to have a measurable impact on rail operating efficiency and hence on average total costs, but the decline to a point below 90 cents, as shown in figure 7, is intended primarily to illustrate the direction of change and why it would occur rather than its probable extent.

This particular example has been developed in such a way as to highlight the paradox of attempting to achieve economic efficiency in transportation by allocating traffic among carriers on the basis of historical cost comparisons. In the illustration presented here, the railroad is clearly the low-cost carrier on the basis of its best potential cost—that is, the cost it would achieve through improved efficiency directly as a result of business attracted by the 10-cent rate reduction. Thus it is graphically demonstrable for this particular market that total transportation costs on a resource utilization basis would be reduced if the rail carrier were permitted to cut its rate by that amount. Preemption by the railroad of the specific traffic shown in figure 7 would tend to push inward the geographic boundary of intermodal competition for this commodity to transportation markets where truck operators possessed cost-equivalence with "best potential" rail costs by reason of shorter distance, more favorable terrain and routing or the availability of backhaul.

Intermodal cost comparisons for a number of specific markets, however, might fail to yield such conclusive results since the potential gain in rail efficiency from attracting the limited amount of traffic available in a single market might be slight. Nevertheless, as explained in chapter 5, so long as the railroad is saddled with excess capacity, it has an incentive to attract more traffic in any market by reducing rates to any level that at least covers variable costs. Even if the fully-allocated cost of handling freight attracted by such pricing remained above the

average total cost of the carrier from which it was diverted, the increase in rail traffic would exert some downward pressure on average rail costs by permitting improvements in operating efficiency. In these cases, specific rail proposals to reduce rates can be neither justified nor rejected solely by analyzing potential cost relationships in the single market to which the reductions would apply since the expected benefit to carrier and shippers lies primarily in the general improvement in overall rail operating efficiency.

Analysis of individual markets—such as that undertaken here—confirms graphically the conclusion of chapter 5 that underutilized rail capacity imposes unnecessary economic costs on shippers in general. It follows from this that more aggressive competition on the part of the railroads, resulting in reallocation of some traffic, could realize net savings for all in terms of economic efficiency. But graphic analysis of each specific market for which a rate change is proposed cannot always provide an automatic test of those proposals. The optimum allocation of particular traffic among carrier types often is not graphically determinable.

Since the 1958 amendment to the Interstate Commerce Act, the ICC has increasingly permitted rail applicants to reduce specific rates to levels somewhat below fully allocated average costs. A complicated and rather arbitrary formula for longrun variable costs, including a number of overhead costs, is usually applied to determine whether rates proposed for a particular haul are compensatory. Rate cuts permitted under this formula may approach but can never reach marginal cost pricing. More significant than this limitation is the fact that successful applications have usually been presented as defensive proposals. The prevailing regulatory attitude has been one of allowing limited departures from full-cost pricing where this is necessitated by demonstrable traffic loss through increased truck or barge competition. The rate reductions allowed in specific instances have usually been held to levels intended to maintain or restore an existing division of traffic between carrier types.

While this policy tends to prevent further erosion in the operating efficiency of the rail system, it does not permit improvements based on reaching fuller capacity utilization. Indeed, a defensive ratemaking policy which permits only lagged reactions in response to competitive inroads may fail to assure the railroad sufficient traffic to provide a reasonable return. Even where the carrier is able to cover the higher average costs associated with restricted amounts of traffic, relationships of the sort presented in figures 6 and 7 demonstrate that this position represents an uneconomic equilibrium. It is uneconomic from the standpoint of the rail carrier, the shippers (who are paying more than necessary and moving less traffic than they would at lower rates) and the economy (which is expending more resources than necessary in moving each unit).

Economic efficiency is not—and cannot be—the only goal of transportation policy. Policy decisions also aim at preserving viable competition, at maintaining a transportation system adequate for defense needs[49] and (perhaps debatably) at meeting various nontransportation objectives which have become traditional in national transportation policy. It is demonstrable that the way in which intermodal competition now allocates traffic among carrier types involves economic waste and inefficiency.[50] This has important policy implications. But before formulating these in relation to other and sometimes incompatible goals, the dynamic aspects of intermodal competition as it has developed over recent years will next be examined in more detail.

---

[49] Interstate Commerce Act, National Transportation Policy.

[50] Nelson, op. cit., pp. 500-505.

Theoretical analysis of intermodal competition for farm product traffic, such as that developed in the preceding chapters, leads to certain expectations concerning when and where such competition will occur and how traffic will tend to be divided in markets where two or more carrier types are competing for the same hauls. Such data as are available generally bear out these expectations and illustrate how competitive ratemaking and traffic allocation adjust over time in transportation markets characterized by present regulatory policies.[50a]

Aggregate data of the type presented earlier revealed the overall impact of intermodal competition through the changing proportions of total traffic hauled by rail, truck, and barge carriers and through declining indexes of transportation rates for commodities in general and for agricultural products in particular. Data such as these can indicate the direction and magnitude of broad changes, but they are not helpful in establishing whether or not competition exists for particular hauls at particular points in time or whether ratemaking and traffic allocation conform to any predictable pattern.

This is partly because adequate data are not made available to the regulatory agencies for analysis. Analyses of specific transport markets are limited. Reliable information is not generally collected on the amount of traffic moved by unregulated truck or barge operators or on the rates they charge. Statistics on railroad traffic volume are also deficient for the present purpose because they are compiled in terms of carload lots without reference to distances traveled. More fundamentally, however, even if aggregate data were reported regularly, these would not identify the critical relationships among particular carriers which permit active competition to develop for particular traffic.

Intermodal competition occurs whenever two or more carrier types are willing and able to haul the same commodity from the same origin to the same or alternative destinations at competitive rates. The conditions which make intermodal competition possible for some hauls and not for others depend on the service needs of particular shippers and on the geographic circumstances affecting carrier costs for particular hauls. They must, therefore, be identified independently for each traffic movement.

Geographic Factors as Determinants of Intermodal Competition

Geography, as the term is used here, may be broadly defined as distance modified by climate, terrain, and the flows of traffic moving in both directions between any pair of origins and destinations. A key premise in the theory of intermodal competition as developed in the foregoing chapters is that such geographic factors will determine for any given commodity which traffic movements will be served predominantly by one or another mode and which will be sought actively by two or more competing carrier types.

Except for short hauls, where pickup and delivery expenses are a significant fraction of total cost, actual railroad costs will usually be lower than actual truck costs. The longer the distance involved, the greater this advantage becomes in absolute terms unless it is counteracted by unusual terrain or routing, or unbalanced traffic flows. Shippers are usually prepared to pay some premium for truck transport, and for short distances the amount of this differential is likely to offset the small cost advantage of shipping by rail. But as distances increase, the absolute cost advantage of rail transport grows and rate differences eventually exceed the service differential that most shippers will pay.

Therefore, a presumption exists that traffic which can be handled by either carrier type will move mostly by truck when distances are short and mostly by rail when long hauls are required. For intermediate distances, traffic may either be divided between competing carrier types or, where factors other than mileage influence their relative costs, will move principally by the carrier that happens to be favored by circumstances. Intermediate-distance traffic would include some movements in which both carrier types participate substantially, some hauls served predominantly by rail, and others in which truck or truck-barge combination service predominates.

50a Data presented in this chapter and the next cover specific time periods from 1956 to 1965. While the precise levels of traffic and the shares moved by competing modes are applicable only to the years shown, the patterns of geographic division and of rate changes among competitors seem generally representative of longer term trends for the products.

The validity of this relationship between distance and the relative advantages enjoyed by motor and rail carriers can be shown in terms of a single product moving from a limited number of origins to a range of destinations under widely differing geographic conditions. A study of fresh potato transportation from five major producing areas to markets all over the country provides such an illustration.[51] In this study, data collection in each of 37 major cities were compiled in such a way as to show, for 1958 and for 1963, the volume of potatoes unloaded in each city from each of five producing areas (California, Idaho, Maine, New York, and the North Dakota-Minnesota region) and to distinguish the proportion of these shipments which arrived by truck and by rail (table 21).

Considered in the aggregate, traffic in fresh potatoes was subject to vigorous intermodal competition over the 5-year period, and truckers expanded their share of unloads from 41 to 46 percent of the reported total. Unloads were measured in terms of 43,000-lb. rail carload lots and their truckload equivalent. According to 1958 unload statistics, trucks delivered more fresh potatoes than railroads did at only 11 of the 37 cities in the survey; by 1963, they predominated in 16 marketing areas, and 26 cities reported receiving a larger share of fresh potatoes by truck in that year than they had 5 years earlier.

Despite this overall picture of aggressive truck competiton for traffic which formerly moved by rail, not all hauls of fresh potatoes from the five producing areas became competitive during the 5 years prior to 1963. Instead, the actual pattern of rail-truck deliveries for specific traffic movements—that is, between particular producing centers and particular markets, as shown in table 21—illustrates the expected geographic relationship of rail and truck shares based upon relative costs for moving traffic different distances.

Table 21 shows the truck share in 50 specific traffic movements in 1963. For each of the five producing areas, the 10 largest movements to marketing centers among the 37 included in the survey have been grouped according to distance in highway miles. Movements between these 50 pairs of origins and destinations—all representing substantial though very unequal quantities of potatoes—show that motor

[51] Ivon W. Ulrey. Fresh Potato Transportation to Large Markets from Five Major Producing Areas. U.S. Dept. Agr. Mktg. Res. Rpt. 687, Nov. 1964.

Table 21.—Truck share of all potatoes moving from five producing areas to 10 destinations, 1963 and 1958[1]

Truck share in total rail and truck unloads (Percent)	Distance in highway miles from producing areas					
	Less than 500	500-999	1,000-1,499	1,500-1,999	2,000 or more	Total
	Number of origin-destination couplets observed					
1963:						
80 or more	13	–	2	–	–	15
60-79	1	1	2	–	–	4
40-59	–	4	–	1	–	5
20-39	–	–	4	1	–	5
Less than 20	–	4	6	4	7	21
Total	14	9	14	6	7	50
1958:						
80 or more	10	1	2	–	–	13
60-79	3	–	2	–	–	5
40-59	–	2	1	1	–	4
20-39	–	3	2	–	–	5
Less than 20	–	4	9	3	7	23
Total	13	10	16	4	7	50

[1] Producing areas in California, Idaho, Maine, New York, and North Dakota–Minnesota; destinations from each area are its 10 biggest markets in each year.

Source: Ivon W. Ulrey. Fresh Potato Transportation to Large Markets. U.S. Dept. Agr. Mktg. Res. Rpt. 687. Nov. 1964.

carriers predominated in moving potatoes to the 14 destinations located less than 500 miles from the producing area and handled more than 80 percent of the traffic of 13 of these. At distances over 2,000 miles, the railroads dominated as low-cost carriers; this was true with rare exceptions for hauls longer than 1,500 miles. On the other hand, hauls between 500 and 1,500 miles were likely to divide traffic between the two competing carrier types.

If traffic movements for commodities with different service needs were similarly classified, the distances which would be considered "short," "intermediate," or "long" would be likely to differ—in some cases, widely.

Changes Over Time on Length of Haul

Even for the same commodity, distribution of traffic shares by distance may be expected to differ from one period to another, since many factors, including technology and highway improvements, affect the relative costs of carrier types. But such variations do not change the general profile of short-haul truck, and long-haul rail movements or the presence of a mileage zone of competition between.

This can be seen from the lower panel of table 21 where 1958 data for truck shares in fresh potato unloads have been classified in the same manner as the 1963 movements above. The general profile of traffic divided between trucks and railroads according to distance is similar to that found 5 years later, even though truck operators increased their share in traffic between all origins and destinations in the survey by 5 percentage points over the same time.

A close comparison of the 1963 distribution with that for 1958 shows only minor changes: the degree to which trucks dominated short-haul traffic rose somewhat and their relative participation in intermediate hauls increased slightly. Most marketing destinations for each producing area remained the same for both years, but markets which rose in ranking between 1958 and 1963 tended to be located where improved truck service was becoming more readily available.

Table 22 gives detail on competitive changes in traffic movements between particular pairs of origins and destinations. Here the 10 most important 1963 destinations from California, Idaho, Maine, and the North Dakota-Minnesota producing areas are ranked from nearest to most distant, and the truck share in each of these traffic movements is shown for both 1958 and 1963. For each traffic movement where this share rose or fell by more than 5 percentage points, the change is noted in a third column.

Among the 40 hauls—encompassing all distance categories—17 such significant shifts-on-balance in the relative shares of competing carriers occurred between 1958 and 1963. In 12 of these cases, truck operators increased their share in total unloads at a particular destination by more than 5 percentage points, but at the other 5 markets there was a significant increase in the rail carrier's share. The greater intensity of competition for intermediate hauls is again apparent in these statistics; out of 21 movements from origins to markets between 500 and 1,500 miles distant, the percentage of unloads arriving by truck and rail shifted significantly in 13 cases.

Changes in Highway Conditions and Traffic Patterns

The general observations made above confirm the importance of distance in determining the relative effectiveness of trucks and railroads as competitiors, but since table 22 shows specific hauls by origin and destination, it is also possible to identify the impact in particular cases of some factors other than mileage which extend or limit the range of truck-rail competition.

Generally speaking, the direct relationship between mileage and mode of transportation is most clear-cut for western producers. From California, marketing of fresh potatoes was split between short truck hauls to nearby metropolitan areas and long rail hauls—mostly more than 2,000 miles—to Midwest and East Coast distribution centers. Movements between 1,000 and 2,000 miles showed the fluctuating division of traffic which characterizes active intermodal competition, though only over the route to Houston, where mild weather combines with widespread availability of westbound traffic, do trucks appear to play a significant though highly variable role.

For Idaho producers, climate and east-west traffic patterns are less favorable to east or southbound truck traffic in fresh potatoes. No significant truck unloads were found at distances greater than 1,000 miles, although over 70 percent of all Idaho potatoes reaching that area's 10 most important marketing

Table 22.–Truck share of potatoes unloaded at markets located at various distances from California, Idaho, Maine, and North Dakota-Minnesota producing areas, for 1958 and 1963

Location of market and distance from producing area	Truck share of unloads		Change exceeded 5 percentage points
	1958	1963	
	Percent		
California			
Under 500 miles:			
Los Angeles	96	93	–
San Francisco	79	81	–
1,000-1,499 miles:			
Seattle	0	23	+23
1,500-1,999 miles:			
Houston	59	34	-25
Minneapolis	5	12	+ 7
2,000 miles or more:			
Chicago	0	0	
Detroit	1	1	
Philadelphia	7	3	
New York City	1	0	
Boston	0	0	
Idaho			
Under 500 miles:			
Salt Lake City	97	95	
500-999 miles:			
San Francisco	65	79	+14
Los Angeles	28	5	- 23
1,000-1,499 miles:			
St. Louis	0	0	
Chicago	0	3	
1,500-1,999 miles:			
San Antonio	14	9	
Indianapolis	1	4	
Detroit	1	2	
2,000 miles or more:			
Philadelphia	7	11	
New York City	1	0	

Location of market and distance from producing area	Truck share of unloads		Change exceeded 5 percentage points
	1958	1963	
	Percent		
Maine			
Under 500 miles:			
Boston	65	61	
Providence	63	88	+25
500-999 miles:			
New York City	7	17	+10
Philadelphia	39	47	+ 8
Baltimore	18	46	+28
Washington, D.C.	44	55	-11
1,000-1,499 miles:			
Cleveland	40	64	+24
Pittsburgh	7	12	
Detroit	0	16	+16
Louisville	35	27	- 8
North Dakota-Minnesota			
Under 500 miles:			
Minneapolis	86	92	+ 6
500-999 miles:			
Kansas City	43	56	+13
Chicago	7	2	
St. Louis	14	7	- 7
1,000-1,499 miles:			
Cincinnati	2	3	
Louisville	34	37	
Memphis	29	13	-16
Dallas	18	23	
Birmingham	75	75	
1,500-1,999 miles:			
New Orleans	51	56	

Note: Destinations shown are the 10 most important for each producing area by 1963 volume.

Source: Same as table 21.

destinations traveled more than that distance–almost entirely by rail.

Eastern and Midwestern producers, on the other hand, market almost their entire output within a radius of 1,500 miles, and a high proportion of the major destinations lie within the mileage ranges where trucks and railroads most actively compete. This was reflected in the larger number of shared traffic movements–those in which both carriers accounted for significant (and often fluctuating) shares of total unloads. But factors other than distance often determine whether or not truck operators can bid for traffic to particular destinations at rates competitive with those charged by railroads. Of these, the most important are probably highway conditions (including climate) and the availability of payloads for all segments of a round trip.

The transportation pattern for Maine potatoes shows how these factors can interact in a complex fashion. The potato producing area is in the northern part of the State, and total shipping capacity needed

for moving potatoes out of the area substantially exceeds the amount of other traffic coming in. Moreover, weather is unfavorable to over-the-road transport for much of the shipping season. These considerations reduce the attractiveness of this traffic to truck operators. During the period shown in table 22, even the short haul to Boston (about 400 miles, a distance usually preempted entirely by trucks) was sharply divided; the rail carrier continued to account for about 40 percent of total unloads there. New York City, 650 miles distant and the major market for Maine potatoes, remained predominantly a rail destination, despite a recent small increase in truck traffic.

But a number of less important destinations at greater distances—and particularly those further south along the Atlantic seaboard—recorded a high and rising share of truck unloads. This apparent paradox is explained in part by the fact that northbound movements of fresh fruits and vegetables from the South terminate in major metropolitan areas, including Boston and other New England centers, and generate a demand for backhaul traffic for trucks. Since this northbound movement would likely occur even if it had to bear the round-trip freight, very low rates may be offered to obtain return-trip cargoes.

Although no quantitative data are available, significant volumes of truck unloads of Maine potatoes at points south of Boston and Providence reach those points by rail and are there transshipped by truck to take advantage of backhaul rates. That such combination traffic increased during the period of this study is indicated both by the rising truck share in total unloads at many points beyond Boston, and by a substantial increase in the absolute volume of rail unloads at Boston.

This probably constitutes a rather special case since true backhaul traffic of the sort explained above depends on the existence of an otherwise unbalanced traffic flow made up of shipments profitable enough, or nearly so, that they would occur whether or not return cargo could be found and would bear—if necessary—the full cost of moving motor equipment over the round trip. Where such a fronthaul exists, shippers with freight available as a blackhaul may sometimes obtain service for little more than the added cost of pickup, handling, and delivery.

Conversely, the cost of truck transportation to prospective shippers over routes where an outbound trip has little prospect of a return load may be twice as great as charges for the same distance where outbound shipments are usually balanced by equivalent traffic moving in the other direction. Except for traffic which benefits from premium qualities of truck service, truck costs are not likely to be competitive with rail rates unless the truck operator can expect to travel fully loaded most of the time. In any area originating shipments for a number of different destinations, this is likely to be true for some traffic movements and not for others. The pattern of intermodal competition to be expected in these situations is similar to that displayed by potato shipments from the North Dakota-Minnesota producing area. There, intermediate-haul shipments to Chicago (the single most important market) moved almost entirely by rail, as did those to St. Louis and Cincinnati, but truckers provided an important share of southbound service to several more distant destinations, including Dallas, Birmingham, and New Orleans.

Service Differentials as Determinants of Intermodal Competition

Rates reported by individual shippers indicate that the absolute cost of shipping potatoes by truck is almost always above the comparable rail rate. Since these reports include routes over which most shippers choose truck transportation, the higher rate must be competitive in those instances and presumably includes a premium in favor of truck service.

It is not surprising that potato shippers should value the speed, better scheduling, and flexible handling that truck operators offer, but such qualities should weigh even more heavily with shippers of fruits and vegetables that have higher ratios of value to weight. Improvements in highways and transportation technology should enable truck operators to increase their share in such traffic faster and farther than for less perishable produce. Both of these suppositions are confirmed by a sample survey covering the interstate transportation of fresh fruits and vegetables from California-Arizona producing areas from 1951-60.[52] In that survey, total shipments of various commodities (including fresh potatoes) to all out-of-State points were classified according to

[52] Robert M. Bennett. Interstate Hauling of California-Arizona Fresh Fruits and Vegetables by Rail and Truck. U.S. Dept. Agr. Mktg. Res. Rpt. 673. Aug. 1964 and Suppl., Apr. 1965.

eight regional destinations—four west of the Mississippi and four east of it. (fig. 8) For shipments to the most distant regions, motor carriers were not significant competitors for any category of produce during the period. But to all regions where they did supply an important part of the service, their share in transporting potatoes was below that for moving other fruits and vegetables, and well below their share in such highly perishable, high-value traffic as grapes, oranges, or tomatoes.

Regional Trends in Traffic Division

Prior to the 1950's, interstate traffic in Western fresh fruits and vegetables was almost exclusively handled by railroads. About one-third of all fruits and vegetables grown in the California-Arizona producing areas were shipped fresh to out-of-State destinations; this proportion largely remained constant through the fifties. For many individual produce categories, the proportion moving to out-of-State markets as fresh produce in 1960 was far higher: 71 percent for melons, 57 percent for oranges, and 69 percent for celery. Most of this fresh produce traveled long distances to metropolitan markets, and in 1951 motor carriers hauled only 13 percent of it (table 23). During the next decade, however, their share in the shorter and more accessible of these hauls rose so sharply that by 1960 trucks were moving 30 percent of the aggregate traffic.

Truck inroads into rail traffic over this period occurred within a framework of stable regional marketing patterns. The total volume of fresh produce being shipped to out-of-State markets held constant over the 9 years and so did its distribution among regions. In both 1951 and 1960, U.S. markets west of the Mississippi absorbed only 32 percent of the total, while the larger share continued to move to destinations east of the river. The slight decline from 63 to 61 percent in this proportion reflected increasing shipments of fresh produce to Mexico and Canada. The relative importance of specific regions as markets for western fruits and vegetables was also notably stable over the entire period. Because of this, the impact of intensified truck competition is clear. Increases in the truck share of traffic over particular routes in 1960, compared with 1951, represent changes, not in what was moving or where, but in how it was shipped.

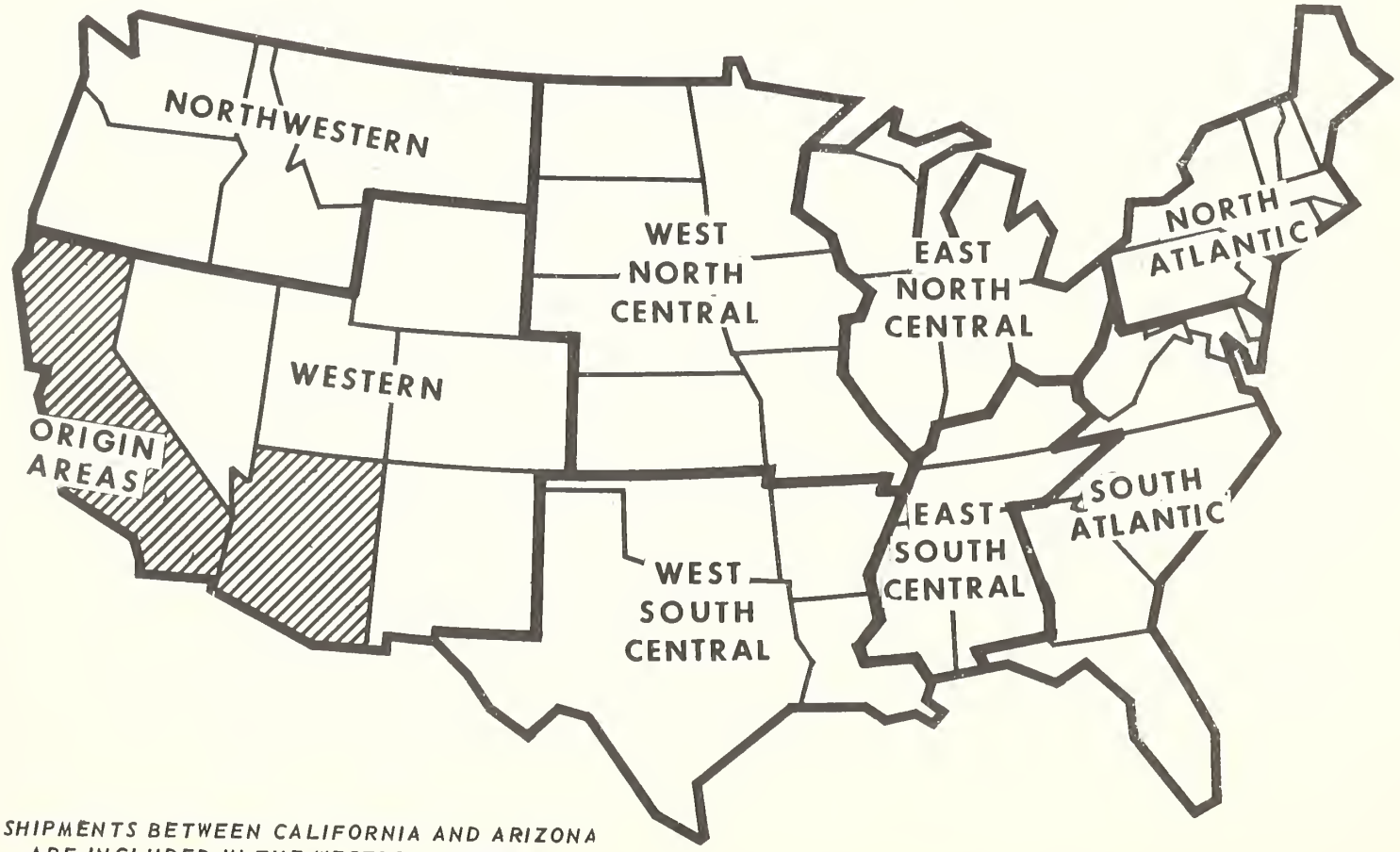
These comparisons parallel the conclusions reached through examining the transportation of fresh potatoes. Important modifications are to be found, however, and these appear to stem from variations in the service requirements associated with different types of produce. The geographic profile of truck transportation for fresh fruits and vegetables in both 1951 and 1960 conformed to the expectation that truckers would dominate short-distance hauls; that commodities moving long distances would go almost exclusively by rail; and that active competition for intermediate hauls would produce more nearly equal divisions of traffic along many routes and might also be marked by changes over time in the relative shares moved by the competing carriers.

In 1951, truckers hauled 77 percent of the produce sent from the California-Arizona area into the nearby States in the rest of the western region. The percentage could undoubtedly have been much higher if intrastate movements had been included. On the other hand, no measurable truck movements of western produce were reported to the major metropolitan markets in the East-North-Central States or along the North Atlantic seaboard. Ninety-nine percent of the traffic for destinations east of the Mississippi went by rail. For the combined areas west of that river, however, nearly two-fifths of the California-Arizona fruits and vegetables for out-of-State markets arrived by truck.

By 1960, the truck share in the national total more than doubled. Dominance of transportation to the closest out-of-State markets had become more complete (95 percent compared with 77 percent in 1951), and in the West as a whole, truck operators supplied nearly three-fourths of the service. Particularly dramatic was their penetration into the west-south-central region where terrain and climate favored highway operations. Eighty-two percent of the destinations in Texas, Oklahoma, Arkansas, and Louisiana were served by truck in 1960—up from 28 percent 9 years earlier.

This same expansion in the radius of intermediate-haul traffic extended across the Mississippi, but only into States south of the Ohio. Trucks for the first time captured a significant share of business in transporting the relatively small volume of western fruits and vegetables destined for markets in the Southeastern States. On balance, however, technological and highway developments during the 1950's did not succeed in extending the range of truck competition to include the major eastern marketing areas, and the truck share in all movements east of the Mississippi rose only to 8 percent.

Fig. 8- DESTINATION REGIONS FOR RAIL AND TRUCK SHIPMENTS OF CALIFORNIA-ARIZONA FRESH FRUITS AND VEGETABLES, 1951-60



SHIPMENTS BETWEEN CALIFORNIA AND ARIZONA ARE INCLUDED IN THE WESTERN REGION.

U. S. DEPARTMENT OF AGRICULTURE NEG. ERS 2853-68 (7) ECONOMIC RESEARCH SERVICE

Table 23.–Regional destinations of interstate shipments of fresh fruits and vegetables from California-Arizona and truck share in shipments to each region, 1951 and 1960

Region	Regional Share in total shipments		Share of shipments moving by truck	
	1951	1960	1951	1960
	Percent			
Total West of Mississippi:	32	32	38	73
Northwestern.	6	6	57	68
Western . . .	6	7	77	95
West-North-Central . .	11	10	13	51
West-South-Central . .	9	9	28	82
Total East of the Mississippi:	63	61	1	8
East-North-Central . .	23	21	0	9
East-South-Central . .	3	3	3	49
North Atlantic	31	30	0	1
South Atlantic	7	8	2	19
Total .	100	100	13	30

Note: Subtotals do not add to 100 because of small shipments to Canada and Mexico.

Source: Robert M. Bennett. Interstate Hauling of California-Arizona Fresh Fruits and Vegetables by Rail and Truck. U.S. Dept. Agr. Mktg. Res. Rpt. 673. August. 1964.

Variations Attributable to Service Differentials

When data on the movement of all types of western fruits and vegetables are compared with observations drawn from the potato study, truck operators are shown to have moved a higher proportion of fruits and vegetables in each successive distance category. Moreover, the longer hauls reported in 1960 extended the effective range of truck competition well beyond the mileages that marked the outer periphery for most truck hauls of potatoes. The longer and more rapidly expanding radius of truck competition for fresh fruits and vegetables appears to reflect directly the greater service needs of shippers moving perishable produce. These would normally justify larger rate differentials in favor of truck transportation than those for hauling potatoes.

That this was the case can be seen from table 24, where the regional comparisons for 1960 traffic flows which were summarized in table 23 are shown for specific types of produce. Even in the western and west-south-central regions where truck service predominated for all types of fruit and vegetable traffic, the truck share in potato shipments was measurably below that for more perishable produce. For longer hauls, it quickly became insignificant. Conversely, shipments of grapes and oranges were relatively more likely to move by truck to intermediate destinations than was other produce, and some reached areas on the outer periphery of truck-rail competition.

The relatively high degree of truck participation in movements of "other vegetables" to destinations in this outer mileage range is attributable primarily to sharp increases in movements of tomatoes by truck. This traffic trend emerged after 1951 and by 1960 influenced the way in which tomatoes were shipped to markets as far distant as Chicago (where produce firms in that year reported that more than half of their receipts arrived by truck) and even New York City, although no other truck receipts of any significance were reported there.

This information was drawn from interviews with a sample of produce firms in selected cities located between 1,000 and 3,200 miles from the main western producing areas for fruits and vegetables (table 25). Truck receipts at five widely separated metropolitan markets are shown as a percentage of all receipts reported from California and Arizona. At any given market, only those produce categories are shown separately for which western growers were a significant source of supply–here taken to mean that they furnished at least 20 percent of the total amount received from all sources by all modes.

The reliance of a given market upon western suppliers is, of course, highly variable. At Denver, 40 percent of all fresh fruits and vegetables were drawn from the California-Arizona region in 1960, and local produce firms indicated that western growers supplied a significant share of all reported commodities. Atlanta, on the other hand, is located in the southeastern fruit and vegetable producing area, and drew only 14 percent of its fresh produce from western sources; even so, western producers were important suppliers to Atlanta in four major categories–grapes, lemons, lettuce, and melons.

Both Chicago and New York drew on western producing areas for roughly one-third of their fresh produce needs, and in 1960 the bulk of these shipments continued to arrive by rail. The most significant exceptions were the growing truck traffic

Table 24.–Truck share: shipments of California-Arizona fresh fruits and vegetables to regional destinations, by commodity, 1960

Region	Commodity							
	Total	Grapes	Lettuce	Melons	Oranges	Potatoes	Other fruits	Other vegetables
	Percent							
West of Mississippi:								
Northwestern . .	68	87	93	65	68	27	78	71
Western	95	99	98	96	98	79	99	97
West-north-central	51	80	60	45	69	12	49	69
West-south-central	82	97	88	82	95	55	86	92
Total	73	90	81	69	79	40	78	83
East of Mississippi:								
East-north-central	9	12	8	5	15	1	12	15
East-south-central	49	76	50	31	66	12	55	73
North Atlantic . .	1	1	1	1	0	0	1	3
South Atlantic . .	19	36	19	8	12	3	19	29
Total	8	11	10	4	7	1	10	13

Source: Robert M. Bennett. Interstate Hauling of California-Arizona Fresh Fruit and Vegetables by Rail and Truck. U.S. Dept. Agr. Mktg. Res. Rpt. 673. Aug. 1964.

Table 25.–Truck share of unloads of fresh fruit and vegetables from California-Arizona at 5 widely separated metropolitan markets, 1951 and 1960[1]

Commodity	Denver		New Orleans		Chicago		Atlanta		New York	
	1951	1960	1951	1960	1951	1960	1951	1960	1951	1960
	Percent									
Total[2]	48	94	10	52	0	10	5	44	0	2
Carrots	53	91	0	0	0	4	0	0	0	1
Celery	30	96	23	25	0	1	0	0	0	1
Grapes	57	100	28	81	1	9	4	71	0	0
Lemons	49	91	10	54	1	9	0	30	0	0
Lettuce	53	97	5	55	1	8	1	54	0	2
Melons	50	97	6	42	0	5	4	26	0	1
Oranges	59	98	0	0	1	18	0	0	0	0
Peaches	45	99	0	68	0	0	0	0	0	0
Tomatoes	36	95	20	59	1	53	0	0	0	18
Proportion of all fresh fruit all veg. receipts originating in Calif.-Ariz..	39	40	28	24	35	35	14	14	30	32

[1] Commodity categories not shown separately for any market at which shipments from California-Arizona origins did not constitute at least 20% of total receipts in that category.
[2] Includes a number of categories not listed separately.

Source: Robert M. Bennett. Receiving California-Arizona Fresh Fruits and Vegetables by Rail and Truck, Supp. to U.S. Dept. Agr. Mktg. Res. Rpt. 673. Apr. 1965.

in tomatoes, and some oranges destined for Chicago. For hauls between western growing areas and New Orleans or Atlanta, on the other hand, truck operators increased their shares from a minor fraction to half or nearly half the total. At Denver, where trucks had delivered about half of all shipments in 1951, the diversion of the rest from rail carriers was almost complete by 1960.

For some highly perishable commodities, such as grapes, motor carriers had become the dominant mode of transportation to cities as far away as Atlanta, but their inroads into even this premium-quality traffic were not significant at Chicago, and no truck hauls to the New York area were reported. Thus it appears that shipments to destinations on the North Atlantic seaboard and—with few exceptions—to those in the East-North-Central region as well, remained beyond the fringe of truck-rail rate equivalence even for highly perishable, high-value produce in 1960.

Implications for the Theory of Intermodal Competition

On balance, the empirical data drawn from the transportation studies described above indicate that the transportation of farm products at any given time is divided between truck and rail carriers according to a generally predictable geographic pattern. Shippers' choices between the two modes depend directly on rate comparisons as modified by service differentials for the handling needs of specific produce. But these rate relationships generally respond to the greater impact of increasing distance upon truck costs so that the competitive effectiveness of truck carriers varies inversely with the length of particular hauls.

Actual data on truck and rail shares in most types of traffic do not follow a smooth progression correlated with distance because specific hauls are often subject to special circumstances which extend or impair the ability of truck operators to offer rates competitive with those of the rail carrier. These expections can be explained most often in terms of total traffic flows—that is, the magnitude of all commodities capable of being handled by the same equipment which are actually or potentially moving over the same route in both directions. Capability, in this instance, must include regulatory freedom to accept particular traffic. For-hire truck operators specializing in hauling exempt commodities cannot handle regulated commodities as backhauls except under lease to a regulated carrier. Climate, terrain, and highway conditions also limit the competitive ability of truck carriers.

If the forces determining truck and rail rate relationships remained constant, existing patterns of traffic division might be expected to persist over time, yet truck competition for farm product traffic has become increasingly effective in recent years. This has been demonstrated for the commodities surveyed here through the success of motor carriers in pushing outward the geographic range of truck-rail competiton for perishable or semiperishable products as well as their increasingly complete absorption of most short-haul movements and their rising share of many intermediate hauls.

The equilibrium theory of traffic division among competing carriers assumed that truck or barge operators could decide, knowing the fixed rail rates and their own costs, the traffic for which they could compete and the amount of service they could afford to offer. In examining challenges and responses through which carriers compete for specific traffic flows, the simplifying assumption of fixed rail rates will be dropped, but it supplies a reasonable point of departure for such a study. Truck and barge operators know that published rail rates will be changed only through regulatory procedures, which are time consuming and subject to protest. The nature of this process also makes it less likely that competitive moves will be initiated by the rail carrier; rate reductions may be expected to occur in response–often belatedly–to prior traffic inroads on the part of trucks or barges or both. Although some rail carriers have initiated important rate or service innovations, even these carriers have generally been motivated by the need to hold traffic or recapture it from competing carriers.[53]

Historically, intermodal competition for farm product traffic has developed through a series of such successful competitive encroachments on traffic movements traditionally carried by rail. In part, these have become possible through technological progress or highway and waterway improvements which have lowered carrier costs or increased their accessibility to particular locations. Wider transportation alternatives have thus become available to shippers seeking service between particular pairs of origins and destinations. The overall intensification of intercarrier competition has been the sum of many such individual developments.

It is not always possible to verify individual changes in shippers' options through observation. Often the improvements initially become known only to local market participants. Rates charged by truckers for hauling unregulated commodities are unpublished and may be individually negotiated; barge rates–though frequently published–need not be adhered to in bargaining situations, and arrangements to use the shipper's privately owned facilities "at cost" often mask rate concessions. Thus changes in the cost or accessibility of truck or barge transport to particular shippers are not a matter of public record. Often they can be observed only indirectly through changes in traffic movements.

Shifts in traffic are not directly measurable for most farm product movements, since volume statistics are not regularly collected from truckers engaged in hauling exempt commodities. Rail statistics are collected and published in considerable detail, but the intensity of competitive pressures cannot be inferred from these alone since traffic diversion to other carrier types often takes the form of the railroad's failure to participate proportionately in traffic growth rather than an outright shrinkage in volume from preceding levels. Traffic increases generated by economic growth usually cannot be identified separately nor related to specific routes.

One clear indication of increased competiton does, however, become a matter of record. Railroads experiencing an unsatisfactory traffic trend in particular commodity movements usually respond by proposing rate reductions, and these, of course, become public knowledge. Thus the most generally available indicators of intermodal competition–its timing, location, and intensity–probably consist of rate reductions sought by railroads.

Although quantitative data on the amount of traffic moving and its division among carrier types are inadequate for a nationwide analysis, there are some traffic movements of specific commodities for which reasonable estimates both of total volume and of the share moved by major carrier types can be made. Where such data are available, changes in applicable rail rates can be examined in relation to the traffic trends which preceded them and some conclusions drawn as to the ways in which a particular railroad reacted to a particular set of competitive pressures.

Observations of Intermodal Competition

Several cases are presented below where railroads have instituted rate reductions in the face of actual or threatened traffic diversion. When each of these is examined in the light of its geographic circumstances, the response to competitive pressure by the carrier appears to have followed a consistent pattern. That

[53] One example is the Southern Railway case described later.

pattern is then generalized and tested through a multiple linear regression analysis, using a nationwide sample of published rate changes between different pairs of origins and destinations together with estimates of rail and truck costs for the same hauls.

Both the detailed examples of specific competitive situations and the data for the more general statistical test are drawn from traffic in grain—a commodity which moves in quantity from many different origins to destinations all over the country for domestic use and to ports for export. Grain traffic movements illustrate different geographic and competitive circumstances without losing comparability in terms of the commodity shipped. Moreover, from the standpoint of users, even a single type of grain—such as wheat—can differ significantly in suitability for particular purposes, according to its place of origin and the growing season.

Grain can be handled satisfactorily by all three of the major modes of transportation. Shippers presumably have preferences among these carrier types, but their actual shipping needs do not usually justify paying a high premium for differences in the service offered. Although more accurate comparisons of rail, truck, and barge rates for moving wheat would require an adjustment to make them service-equivalent, conclusions are not likely to be distorted greatly if we assume that approximately equal rates are competitive and that an increasing share of traffic will gravitate to the carrier offering the lowest rate, if service at that rate is widely available.[54]

Figures on wheat arriving for export at various ports of exit are compiled in such a way as to show the rail, truck, and barge components of total receipts and thus provide information on traffic shares on a continuing basis. These records are the principal source for figures in table 26; figures in other tables are drawn from several sources. Some data on barge tonnage over the Nation's inland waterway system are collected regularly by the Army Corps of Engineers.[55] Special-purpose estimates of traffic moving between selected origins and destinations are frequently assembled for presentation in rate cases before the ICC. The truck component of these may be based on direct samplings of highway traffic over certain routes or on shipments loaded at particular grain elevators. Where broad regional estimates are being sought, total inflow of grain into the region is calculated by deducting local production from regional grain usage; then known rail and barge shipments into the area may be subtracted from this total to derive the estimate of truck movement as a residual (table 27). (The accuracy of this estimating technique may be reduced by regional cross-flows, since some grain shipments also move out of regions which are net "importers" of grain. Where the estimate refers, as in the case cited later in this chapter to a heavy deficit region of large size, the degree of distortion probably is not great.) Such special-purpose compilations, of course, represent incomplete data covering limited time periods—usually not the most recent. But they make it possible to single out certain specific changes in traffic flows both by carrier type and by destination and to relate these to rate changes occurring over the same time span.

Table 26 shows receipts of wheat for export at two Gulf Coast ports and two Pacific Northwest ports. These figures reveal three distinct traffic trends. Among the three, growth in the export traffic flow through Houston was the largest and most consistent, with receipts in the 1964-65 season nearly six times those in 1956-57. Both rail and truck carriers experienced rising volume trends over this period, but the increase—particularly through the 1963-64 season—was much sharper for trucks, pushing their share in the expanded traffic flow from just under 40 percent to 60 percent at its peak in that year. Moreover, on certain hauls railroads suffered loss of traffic which they had previously handled. In 1961, for instance, nearly 30 million bushels of what were shipped from Enid, Okla., to Gulf ports by rail, while only about 12 million went by truck—a highway distance of 539 miles. A year later, traffic volume from Enid was unchanged, but the railroads carried only a little more than 20 million bushels while 21 million were hauled by truck.

The volume of wheat arriving at New Orleans for export expanded rapidly between 1959 and 1962 but showed no further growth after that year. The amount of grain arriving by rail declined sharply. The carriers benefiting directly from this shift were barge operators whose share in reported receipts rose from 47 percent in 1959 to 73 percent in 1964-65. But motor carriers played a vital role in this sharp intensification of barge competition as more and

---

[54] Joseph R. Corley, Jr. An Analysis of Grain Transportation in the Northwest. U.S. Dept. Agr. ERS-200, pp. 17-22.

[55] U.S. Army, Corp of Engineers. Parts 1 to 5. Waterborne Commerce in the United States. (Annual publication.)

Table 26.–Wheat receipts at Gulf and Northwest Pacific ports, selected years

Area, port, and period	By rail		By barge		By truck		Total	
	Mil. bu.	*Pct.*	*Mil. bu.*	*Pct.*	*Mil. bu.*	*Pct.*	*Mil. bu.*	*Pct.*
Gulf Coast:								
Houston:								
1956-57 [1]	12.0	60.9	–	–	7.7	39.1	19.7	100.0
1960-61 [1]	29.2	53.4	–	–	25.5	46.6	54.7	100.0
1962-63 [2]	32.4	45.9	–	–	38.2	54.1	70.6	100.0
1963-64 [2]	39.8	39.9	–	–	60.0	60.1	99.8	100.0
1964-65 [2]	56.1	50.9	–	–	54.2	49.1	110.3	100.0
New Orleans:								
1959 [1]	10.1	53.4	8.8	46.6	–	–	18.9	100.0
1962-63 [2]	24.0	42.2	32.9	57.8	–	–	56.9	100.0
1963-64 [2]	*26.1*	36.7	45.1	63.3	–	–	71.2	100.0
1964-65 [2]	14.6	26.6	40.3	73.4	–	–	54.9	100.0
North Pacific Coast:								
Longview:								
1962-63 [2]	21.3	62.5	12.8	37.5	–	–	34.1	100.0
1963-64 [2]	23.1	63.3	13.4	36.7	–	–	36.5	100.0
1964-65 [2]	23.8	64.5	13.1	35.5	–	–	36.9	100.0
Portland:								
1962-63 [2]	54.6	70.2	16.2	20.8	7.0	9.0	77.8	100.0
1963-64 [2]	79.5	76.1	18.6	17.8	6.4	6.1	104.5	100.0
1964-65 [2]	62.1	73.1	17.8	21.0	5.0	5.9	84.9	100.0

[1] I&S Docket No. 7942.
[2] Consumer and Marketing Service. Grain Market News. USDA.

more Great Plains producers acquired access to water transportation by trucking grain to river ports.

Still a third situation is illustrated by grain receipts at Pacific Northwest ports where intermodal competition over a 3-year period–mid-1962 through mid-1965–produced neither any sustained change in the total volume of wheat shipments nor any significant shift in how they were transported. Railroads retained the major portion of this traffic. Most of the rest arrived at deepwater ports by barge, but like barge receipts at New Orleans, much of this wheat had been transshipped to inland ports by truck.

Rail Response to Intensified Competition

Of the traffic movements summarized in table 26, that between the Great Plains and Houston affords the clearest example of intensified truck-rail competition for an expanding traffic flow. Indeed, the rapidly growing volume of wheat received at Houston was probably attributable in part to the increasingly favorable terms shippers were able to obtain–largely, though not exclusively, as a result of competitive pressures.

Truck operators appear to have initiated this cycle through increasingly dynamic competition, beginning about 1955 when truck movements of grain in the Houston-Galveston area began to expand. The precise rates they offered shippers to obtain this increased volume are not known, but since the unregulated sector of trucking is highly competitive, it is reasonable to assume that rates were closely related to the cost of providing service.

Several cost studies by USDA have shown that trucking costs for moving unregulated farm products vary almost directly with mileage traveled. During the period covered by table 26, these costs ranged from 30 to 35 cents per mile for a truck hauling 20 tons and traveling fully loaded.[56] These are not firm

[56] John H. Hunter, Jr. Costs of Operating Exempt For-Hire Motor Carriers of Agricultural Commodities. U.S. Dept. Agr. ERS-109. Feb. 1963; also, T. H. Camp. Motortruck Operating Costs of Farmer Cooperatives. U.S. Dept. Agr. Farmer Cooperative Serv. Gen. Rpt. 121, June 1964.

Table 27.–Rail wheat rates from Montana origins to Pacific Coast and Great Lakes and railroad route miles compared with highway miles

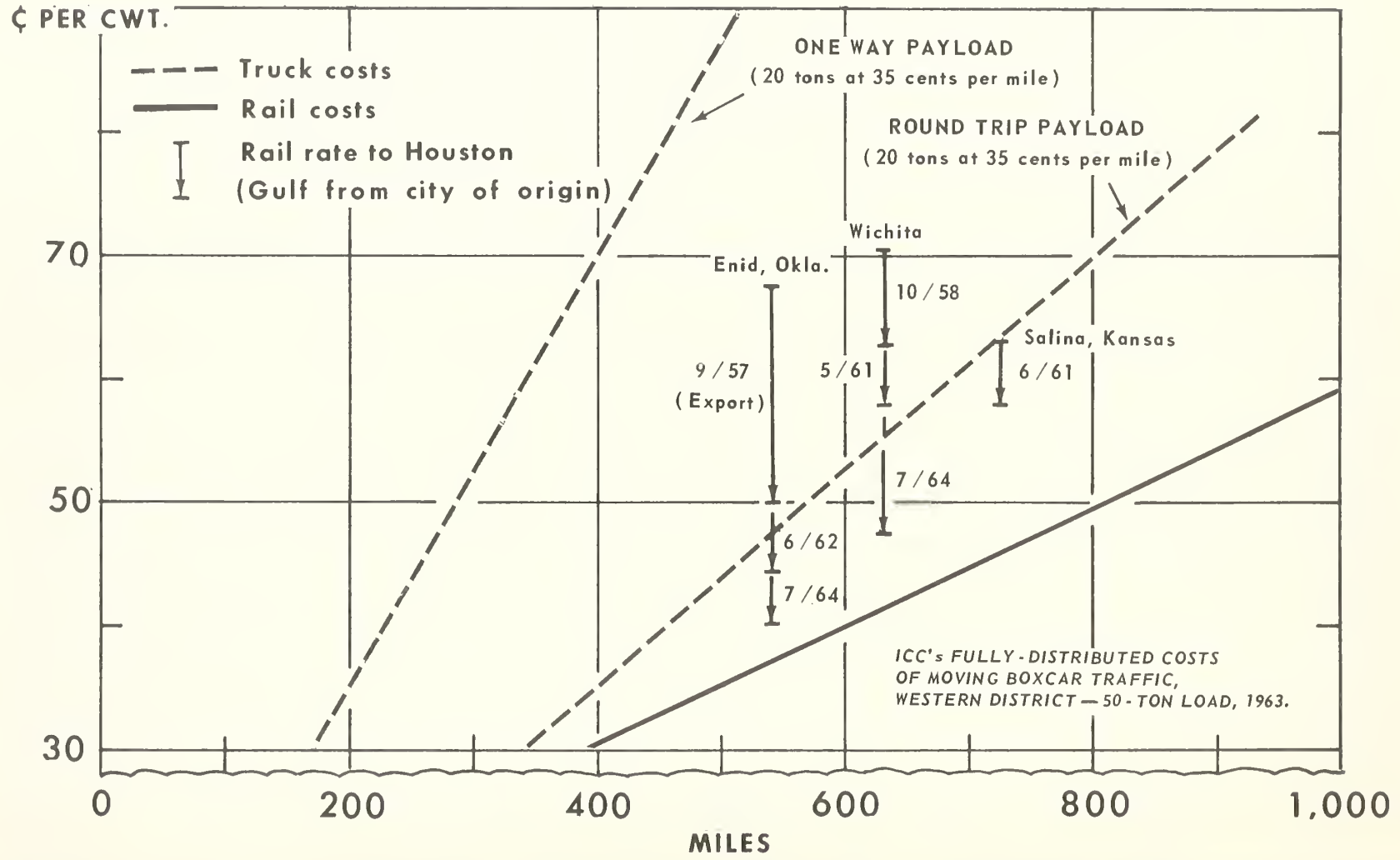
Item	Unit	Destinations			
		Westbound		Eastbound	
		Portland, Oreg.	Seattle, Wash.	Minneapolis, Minn.	Duluth, Minn.
Glasgow, Mont.					
Wheat rate:					
Prior to 10/61	¢/cwt.	92.5	92.5	72.5	72.5
Now	. . do . .	93.5	93.5	73.5	73.5
RR route	Miles	1196	1014	742	779
Highway	. . do . .	1006	935	780	759
Ratio of RR route miles to Highway miles	Pct.	119	108	95	103
Bozeman, Mont.					
Wheat rate:					
Prior to 10/62	¢/cwt.	68.5	68.5 (10/61)	86.5	86.5
Now	. . do . .	51.0	51.0	80.0	80.0
RR route	Miles	1005	866	1012	1023
Highway	. . do . .	782	711	972	1015
Ratio of RR route miles to Highway miles	Pct.	129	122	104	101
Great Falls, Mont.					
Wheat rate:					
Prior to 10/61	¢/cwt.	81.0	81.0	86.5	86.5
Now	. . do . .	65.0	65.0	80.0	80.0
RR route	Miles	1038	856	1018	1055
Highway	. . do . .	732	661	983	994
Ratio of RR route miles to Highway miles	Miles	142	130	104	106
Havre, Mont.					
Wheat rate:					
Prior to 10/61	¢/cwt.	81.0	81.0	86.5	86.5
Now	. . do . .	76.0	76.0	80.0	80.0
RR route	Miles	1043	861	894	932
Highway	. . do . .	845	774	941	920
Ratio of RR route miles to Highway miles	Pct.	123	111	95	101

figures in an accounting sense, nor do they apply to trucks of all descriptions moving under all highway conditions. Spot checks with shippers of agricultural produce, however, confirm that actual rates they were paying for particular hauls were within the range of this estimate.

The two truck cost lines plotted in figure 9 employ the 35 cents per truck-mile figure and translate it into cents per hundredweight of cargo hauled. The lower estimate assumes a payload in both directions while the higher estimate would be required to cover the round-trip cost of a one-way haul. The lower line indicates, for a range of distances, the rates at which truckers might be expected to haul farm products in significant volume so long as they could be moved as part of a balanced two-way traffic flow.

The vertical lines on the same chart show a succession of rail rates for hauling grain from Enid, Wichita, and Salina and are plotted on the horizontal axis at points indicating the highway mileage from these shipping centers to Houston. The rates shown are export rates; that is, they are special rates applicable to wheat moving to ports of exit. The levels portray a series of reductions made from late 1957 to mid-1964. The highest point on each line is

Fig. 9- RAIL RATES FOR WHEAT, FROM VARIOUS ORIGINS TO HOUSTON, IN RELATION TO RAILROAD FULLY DISTRIBUTED COSTS AND TRUCK COSTS



the rate in effect prior to the date of the first reduction (shown to the left); arrows mark subsequent cuts, and the bottom of each line shows the rate in effect after the last of them. The reductions shown are representative. Grain rates from other points in the Kansas-Oklahoma producing area displayed a similar downward progression.

When these successive reductions are related to the figures on traffic volume in table 26, it is clear that so long as rail rate levels did not reach the lowest range within which truck operators could afford to solicit business, reductions failed to halt the deterioriation in the railroad's share of export traffic. The mid-1964 reductions from Enid and Wichita, however, brought rail charges from those points somewhat below the indicated truck-cost line. These rates apparently arrested—and indeed, partly reversed—the adverse trend. Rail wheat shipments reaching Houston the following year rose by 14 million bushels, and the rail carriers' relative share of this traffic rose from 40 to 51 percent of total receipts.

Part of this increase was at the expense of truck volume over the same route, but some of it also reflects success in stemming the diversion of Kansas traffic to the port of New Orleans. This competition developed as a result of lowered barge rates between Kansas City and New Orleans and the increased availability of combined truck-barge service to Kansas shippers. Before the 1964 reduction in the Wichita-Houston rate, for instance, the estimated cost of trucking wheat to Kansas City and then moving it, at the published barge rate, from there to New Orleans was 16 cents per hundredweight below the cost of a direct rail haul to Houston—not allowing for costs of transshipment.

Rate changes in mid-1964 cut this gross differential to about 5 cents. While traffic data for receipts at the port of New Orleans are not detailed enough to prove a direct relationship, table 26 shows that receipts there in the 1964-65 season failed to maintain a large increase in volume that had occurred the previous year. The larger rail flow to Houston very likely includes traffic recaptured from truck-barge diversion to the alternate port.

The Extent of Rail Rate Response to Truck Competition

Rail rate reductions for the three specific movements plotted in figure 9 show that rail carriers responded to the growing volume of truck traffic over these routes with a series of rate cuts that were closely geared in trend and magnitude to the approximate level of truck costs for hauls where round-trip loads were available. Indeed, the new rail rates appear to have been more closely alined with these costs than with those of the rail carriers themselves. Certainly the rail cost line, also shown on the chart, indicates that the rail carriers' own costs of providing service for the distances shown did not impose the effective lower limit on these particular reductions.

This cost line represents the 1963 average fully distributed cost to railroads of moving 50-ton-boxcar traffic in the Western District, as calculated by the Bureau of Accounts for the ICC. Since cost estimates derived in this way are averages of broad aggregates, the precise cost of moving wheat from specific Kansas-Oklahoma origins to Houston may have differed somewhat from the points plotted here. In particular, the cost of handling this traffic may have been increased somewhat because standard rates for moving grain customarily entitle shippers to various privileges—diversion of the shipment to different destinations, service interruptions for storage or processing, etc. When used, these add to the carriers' handling costs. Instances discussed later in which railroads have sought to meet competitive situations with rate cuts sharper than those applied to this traffic often are restricted to service which does not provide these features. But even when allowances are made for such variations, it seems that rail carriers in 1964 had the ability to compete more aggressively for a larger traffic share. Rates which, after the 1964 reductions, remained somewhat above average fully distributed boxcar costs in the Western District must have been well above the out-of-pocket cost that is generally accepted as the minimum for ratemaking purposes.

Rail carriers probably had the capability of cutting rates for these hauls to levels that truck operators could not have matched and thus railroads probably could have obtained substantially all traffic moving over these routes. Instead, intermodal rate relationships were established which alined rail rates in the general range of truck costs. Although these reduced rates succeeded in rolling back the motor carriers' share in this traffic movement from its peak in 1963-64, the new pattern tended to assure that traffic would continue to be divided between both carrier types, with each handling a substantial share.

The cost and rate relationships shown in figure 9 suggest that the margin by which rail rates prior to 1957 exceeded costs for this traffic helped invite truck competition and also encouraged diversion of traffic to more and farther destinations where combination truck-barge service could be arranged. This illustrates the impact upon rail traffic of group or "blanket" rate structures which have historically been applied very extensively to grain shipments.

Such rate structures were designed to yield the railroad a reasonable return on total operations, even though the carrier was often expected to provide long-haul service at rates not much above those charged for short and intermediate hauls which could be moved at less cost to the railroad. The averaging of rates among these classes of traffic meant that rates in effect for the shorter distances—the range in which trucks could compete most effectively—were often well above the fully distributed cost of providing that particular service. Considered separately, these hauls were highly profitable business, but they were also highly vulnerable to truck competition. These circumstances help explain the pattern of restricted rail response to competitive inroads. The slow and partial retreat of these rates, despite limited success in recapturing traffic, probably reflected reluctance on the part of rail management to reduce the return from traffic which, when it moves, is very profitable.

A more important factor, however, may be reluctance on the part of regulatory authorities to approve rate cuts unless these continue to divide traffic between carrier types rather than permitting its capture by either. Approximate equivalence between the rates shippers can obtain from either is necessary to assure this result. Since most of the truck and waterway carriers that haul farm products seemingly operate under highly competitive conditions, this entails seeing that regulated rail rates stay within a range of equivalence to truck or barge costs.

Unregulated competiton would also divide traffic among carrier types, but these divisions (which would be based on the equivalence of truck, barge, and rail costs as calculated by the carriers themselves) would tend to be geographic, with the low-cost carrier over particular routes usually able to capture substantially all traffic of a given type between a particular origin and destination. Only over routes where the effective cost calculations of the carriers fell within about the same range would a substantial division of traffic between them persist.

Competition deliberately based on rail-rate/truck-cost equivalence (that is, on allowing rail rates to decline, but only into the range of truck costs) tends to insure that the shipments in that movement will continue to be divided between two or more carrier types. Generalized broadly, this policy assures the maximum number of shippers a choice among alternative modes. Where differing geographic circumstances affect the character and intensity of competitive pressures, patterns of response are modified to reflect those differences.

Competitive Threats of Limited Extent.—In contrast to the growing export traffic in grain through Gulf ports, table 26 shows that the volume of wheat arriving at ports in the Pacific Northwest showed little change from 1962 through mid-1965, and no significant shifts occurred in its mode of transportation. This stability reflects the fact that producing areas in the northern plains were in a much less favorable location to attract the services of alternative carriers than those in the Kansas-Oklahoma region. This was true both because producing areas are separated from coastal markets and ports by mountains, and because exempt truckers usually find only a limited amount of eligible traffic for backhauls.

Even in such regions, rail rate changes have shown a pattern of response to actual or potential competition, but both the degree of competitive pressure and the extent of the rail carriers' response appears to have been smaller than for traffic moving to the Gulf Coast. Table 27 shows that for 1961-64 the reduction in rail rates from four Montana grain-producing areas were widely unequal among shipping locations (rates from one area increased slightly) and between eastbound and westbound shipments.[57] The markets were equally important to the Montana shippers. It can be assumed that these differences in ratemaking reflected the differing intensity of specific competitive pressures, active or potential.

While both eastbound and westbound rates from Bozeman, Great Falls, and Havre declined somewhat, the cuts applying to westbound movements were much greater than those affecting Midwest

[57] According to a 1960-61 study, grain movements to markets in Minnesota and other north-central States accounted for nearly one-third of grain shipments loaded at country elevators in Montana; about the same amount moved to the Pacific Northwest. The remainder went largely to intrastate points. Corley, op. cit., p. 9.

destinations. This is consistent with the hypothesis that such cuts were tailored, at least in part, to forestall an increasing likelihood of truck or truck-barge competition. As the table shows, the more direct highway routes to the Pacific Northwest offset a considerable part of the rail carriers' cost advantage for long-distance gain movements. Whereas rail and highway mileage to Minnesota was comparable, rail distances to the coast exceed highway distances by as much as 40 percent. Technological improvements in highway transport have brought the distances involved in these westbound movements well within the range for which truckers can compete intensively. Westbound movements can also transship to barges at Columbia River ports, further reducing the mileage of high-cost truck transport.

Nor is the increased pressure felt by rail carriers in this region limited to the possibility of direct truck or truck-barge competition. The growing feasibility of trucking grain increasing distances to parallel rail lines has led to reports of sharply intensified competition among railroads for traffic from certain localities. Rail trunklines that are widely separated have lost their historical monopoly of rail service within much of their own territories.

Compared with the rate reductions made in response to the major and demonstrable diversion to trucks of traffic from the Kansas-Oklahoma region, rate concessions in the Montana area were considerably more limited. If the rates in effect in 1964 were plotted against a truck cost line like that in figure 9, almost all of the new rates would remain above those which truck operators might be expected to offer if they were sure of obtaining comparable loads in the opposite direction. That truckers who had obtained loads into the Montana area were, in fact, underbidding the rail rates for grain traffic in 1960-61 was confirmed in interviews conducted in that year with grain-elevator operators, who reported that truck shipments usually moved at lower rates than those going by rail and that these were backhaul rates offered by truckers seeking return loads. Truck space for such hauls, however, was also reported as being limited in availability to shippers, since truck operators who did not have two-way traffic were not seeking the business except at rates reflecting their full round-trip costs.

Backhaul Truck Rates.—While unbalanced traffic flows of the type discussed above limit the extent of intermodal competiton which rail carriers face and therefore limit the extent of their responsive rate reductions, other unbalanced flows of truck traffic in exempt commodities dictate rail rate adjustments far deeper than needed to meet truck costs for two-way traffic. Shipments of fresh fruits and vegetables out of the nine Southeastern States forced railroads there to counter truck competition for grain moving into the region with exceptionally deep price cuts. When the new rates were put into effect some shippers from west of the Mississippi or north of the Ohio could move grain into the area for only about 40 percent of the former charge for rail shipment.[58]

The nine Southeastern States which compose the Southern Region as defined for regulatory and statistical purposes by the ICC use more grain than they produce. Regional "imports"—mostly feed grains used by the livestock and poultry industries—rose from an estimated 3.6 million tons in 1955 to nearly 11 million by 1960; local production remained about the same. Table 28 shows that truckers accounted for the largest share of this expansion, though barge operators also made important but uneven gains. The traffic growth itself may well have been attributable in part to the fact that less expensive transportation service was becoming available in increasing quantities from these competing carriers.

Over the same period, the volume of rail business increased moderately, but rail participation in the total movement declined from over half to less than one-fourth. Diversion of traffic from rail carriers thus took the form of failure to share in an expanding traffic flow rather than outright loss. The decline in relative share of business was much greater than in the somewhat similar Houston case. Moreover, the totals mask absolute declines in traffic moving over particular routes and at particular times.

Railroads serving the area faced a serious and accelerating deterioration in their competitive position. To reverse, if possible, this deterioration, the Southern Railway in 1961 sought permission to offer a new category of service at sharply reduced rates to shippers on its own lines. These changes were originally proposed for August of that year, but because of litigation did not become effective for

[58] Interstate Commerce Commission. Grain in Multiple-Car Shipments—River Crossings to the South. Invest. and Suspension Docket No. 7656.

Table 28.–Estimated amounts of grain shipped into Southeastern States[1], by mode of transportation, 1955-60

Year	Total amount shipped	Rail		Barge		Truck	
	1,000 tons	*1,000 tons*	*Pct. of total*	*1,000 tons*	*Pct. of total*	*1,000 tons*	*Pct. of total*
1955 . . .	3,646	1,999	54.8	907	24.9	740	20.3
1956 . . .	5,572	1,937	34.8	720	12.9	2,915	52.3
1957 . . .	8,279	2,215	26.8	1,327	16.0	4,737	57.2
1958 . . .	8,492	2,669	31.4	2,036	24.0	3,787	44.6
1959 . . .	10,719	2,154	20.1	2,005	18.7	6,560	61.2
1960 . . .	10,946	2,456	22.4	2,257	20.6	6,233	56.9
Total .	47,654	13,430	28.2	9,252	19.4	24,972	52.4

[1] Includes Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia.

Source: ICC examiner's report.

nearly 2 years–and then in modified form. Litigation and protest continued for many months thereafter.[59] This rate reduction differed from those described earlier in this chapter in that the new rates supplemented rather than replaced those already in effect. The older rates continued to apply to freight moving in standard boxcars with the transit privileges, possibilities of multiple consignment or reconsignment, and time allowances for loading and unloading which have been customary fringe benefits of rail service. The lowest of the new charges, commonly known as "Big John" rates in reference to the large hopper cars, capable of hauling 90 tons or more–roughly twice the conventional payload–proposed to be used for this service, and applied only to shipments of five carload lots. The rates were available only to shippers moving 450 tons of grain at one time, on one bill of lading, to one consignee, at one destination, without transit privileges for storage or processing and with penalties for detaining the cars more than 24 hours. An intermediate rate, 20 percent higher, applied to shippers using one Big John hopper, but meeting the other conditions of shipment. The reduced rates for this stripped-down service applied only to grain; conventional rates applied either to grain or to its products.

Big John rates were not strictly comparable with either the standard rail rates or the truck rates with which they were designed to compete. Shippers using truck transportation were already foregoing the transit privilege and some of the other railroad "fringes," but individual trucks handled far smaller quantities than those which had to be furnished in a single load if shippers were to benefit from either the multiple or single Big John rates.

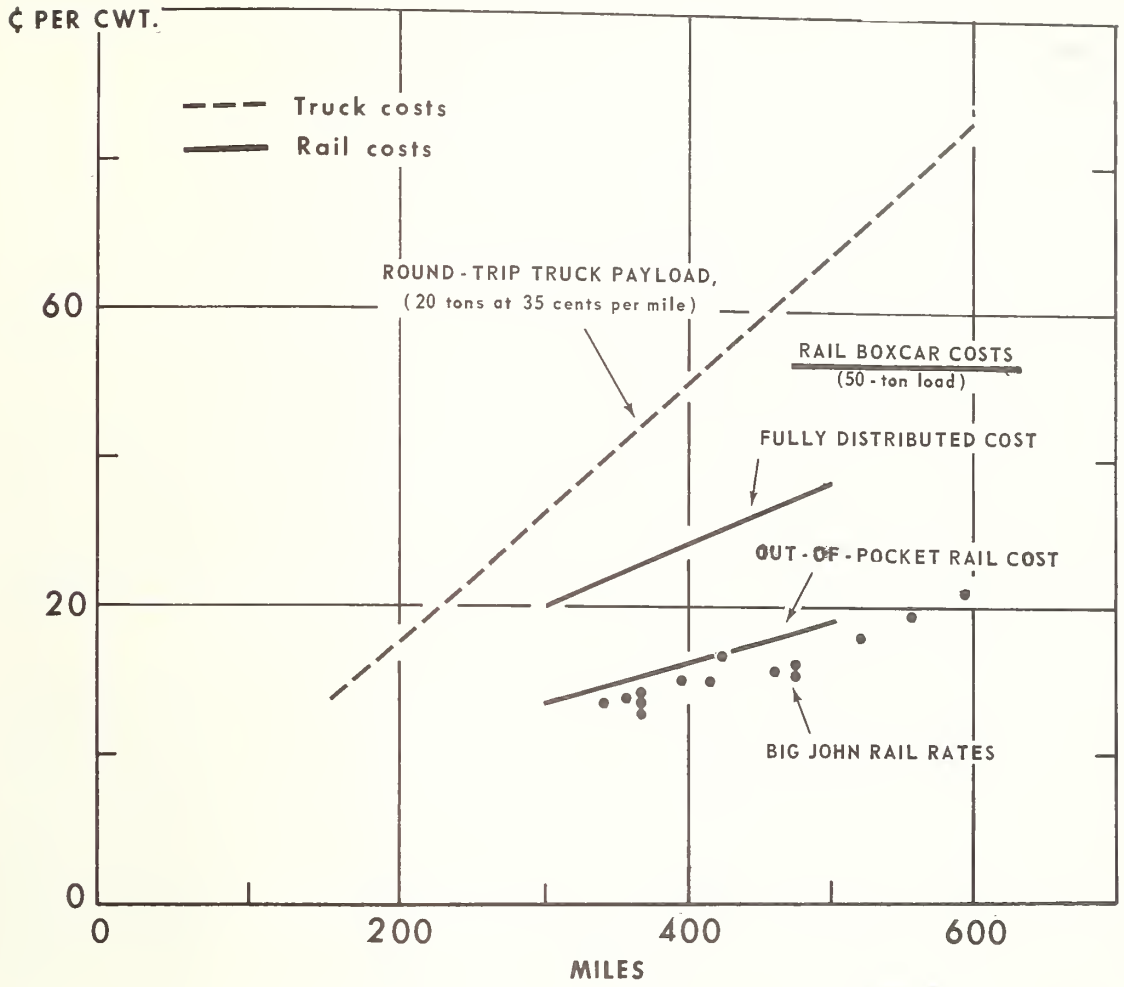
Small shippers probably would not find Big John rates competitive with truck transport at any level, but most large shippers (and these could include small shippers acting in concert) would presumably tend to choose whichever mode of transportation offered them significantly lower rates. A continuing division of the traffic between the two carrier types, therefore, would not seem to be assured unless the rates of both fell within approximately the same range.

The Big John rates were below any rates truckers could be expected to match on the basis of costs calculated at 35 cents per vehicle-mile for a 20-ton capacity truck traveling fully loaded in both directions. Figure 10 shows the new rates from each of five river crossing points to three destinations in Georgia, Alabama, and North Carolina, and all are far below the truck cost. The discrepancy increases with distance, so that rail charges for longer hauls would supply less than half the return that truckers might be expected to ask for the same service.

If truck costs estimated on this basis were an accurate measure of the lowest rate at which truckers were willing and able to offer transportation, the Big John rates would represent very aggressive competition which could be expected to eliminate truckers from most of these traffic movements–at least insofar as shippers could qualify for the new rates. But over these routes, southbound truck service for exempt farm products does not, in fact, depend on the ability of truck operators to collect charges covering their costs as estimated above. Available

[59] See footnote 58.

Fig. 10- BIG JOHN RAIL RATES AT FIVE RIVER CROSSINGS TO LOCATIONS IN ALABAMA, GEORGIA, AND NORTH CAROLINA IN RELATION TO TRUCK AND RAIL COSTS



evidence on actual truck rates for southbound grain shipments from points northwest of the Ohio and Mississippi Rivers strongly indicates that the reduced rail rates merely matched the approximate truck charges already in effect for much of this moving and were aimed principally at stabilizing the intermodal division of traffic at levels more acceptable to the railroad.

Many truck operators specialize in hauling exempt farm products from the southeastern seaboard into the area northwest of the Ohio-Mississippi Rivers. Trucks haul fresh fruits and vegetables, poultry, etc. for midwestern metropolitan areas. As with similar movements along the Atlantic seaboard, this is profitable traffic, capable of bearing the full cost of a round trip, so truckers would make the northbound haul with or without the prospect of a return load. But every trucker involved in this traffic can carry a backhaul, and would be better off with such a load, so long as his receipts were above the added cost of pickup, handling, delay, and deliveries.

Data on the backhaul truck rates with which rail competitors were confronted are incomplete. But some shippers who were sending feed grains to the Southeast reported that they usually had found service available at charges that yielded the trucker

revenue of 11 to 16 cents per mile. The lower end of this range converts to rates closely competitive with those the Southern Railway sought to put into effect.

When the Southern Railway introduced its rate concessions, a substantial portion of grain from north and west of the Ohio and Mississippi River crossings was already moving into the Southeast at rates much below those needed to cover full truck costs. Truckers could offer these rates because they were better off with the traffic than without it, and the railroad had to meet them in order to halt continuing diversion of traffic from its lines. As figure 10 shows, these new rates were at or below the lowest level considered compensatory by the ICC for standard boxcar traffic in the southern region. Permission to use them was contingent on the railroad showing that savings associated with large volume and limited service justified the lower charge.

The situation described here is analogous in its implications for competitive ratemaking to the broader problem posed for rail carriers by persistent excess capacity (ch. 7). When high-value traffic flowing in one direction over specific routes generates competition among truck operators for backhaul shipments in the other direction, full-cost estimates are no measure of how far individual operators can cut rates and still benefit from securing a load. Like the rail carriers with irreducible excess capacity, truckers in this instance have the ability to attract and retain backhaul business at rates far below their fully distributed costs. When confronted with competition for such a traffic movement, the relevant cost calculation for either carrier type can be generalized only as the lowest rate at which net benefit will accrue from attracting the traffic rather than losing it. Freedom from regulation gives truckers the advantage of flexibility in acting on such calculations promptly and changing them as circumstances change. Rail responses may be delayed for months or years, but they may also, as in the Southern case, be highly successful in recapturing and expanding traffic flows.

Intermodal Competition.—The development of intermodal competiton for grain traffic between the Great Plains and Houston suggested a simple hypothesis for predicting rail response to such competition: rail rates would normally be reduced until they were in line with the costs of the competing carrier. Taking account of the geographic modifications illustrated by other traffic movements, this hypothesis can now be reformulated in more general terms. Rail responses to traffic diversion are usually rate reductions (generally after a time lag) to levels approximating the lowest rate at which competing carrier types find a net advantage from offering service in amounts which represent a substantial share of the contested traffic.

Stated in this way, the hypothesis does not preclude wide variations in the extent of rate reductions over different routes or in the relationship of the new rail rates to the estimated full cost for motor carriers. Each example of rail competition with truck or truck-barge service for grain movements revealed a relationship between recent changes in rail rates and the effective cost to alternative carriers providing comparable service to a significant number of shippers.

With reasonably balanced traffic flows, truckers can generally obtain about the same rates in both directions, and their cost calculation relates highway mileage to the cost per mile of moving a fully loaded vehicle. The pattern of rail reductions between the Great Plains and Houston suggests that these calculations applied in that case.

In true backhaul situations—such as that faced by the Southern Railway in seeking to retain grain traffic to the Southeastern States—the relevant lower limit of truck costs may not be reached much above the added expense of handling the backhaul traffic. Deeply discounted truck charges followed by fully responsive reduction in rail rates are likely only when competition among truckers themselves for backhaul loads affects a significant share of the total available traffic. Where railroads find it profitable to make fully competitive cuts, low-cost transportation becomes more widely available to all shippers. Although the direct advantages of the competing rail rates in the southern grain case appeared to apply only to large shippers, if those shippers were drawn back to rail transport, it became easier for smaller shippers to find backhaul truck space at similar prices.

Conversely, lack of balanced traffic flows may impose a limit on the availability of any truck service over particular routes. Where the chances of finding a return load are doubtful, truckers would ordinarily charge round-trip rates to shippers with outbound cargoes. Such rates would normally preclude intermodal competition over that particular route, but the weakness of intermodal competition from lack of

balanced traffic flow is usually a matter of degree. Over most routes, some grain will move by truck, and shippers will be attracted if the rates are below those charged by the railroad.

Degrees of competitive pressure on the rail carrier depend on the amount of available truck service. So long as the limited amount of reverse flow traffic means that truck operators can bid effectively for only a small fraction of a total movement, most grain must move by rail regardless of the relationship between truck and rail rates. As the share finding truck space available at attractive rates climbs, rail rate reductions may be made. Even for such origins as Montana, the increased truck periphery has influenced the pattern of rate reductions. But the competitive pressure was insufficient to force rail rates down to truck costs, since truck capacity for handling westbound shipments was restricted to the amount of equivalent traffic moving into Montana from the Pacific Northwest. Even though shippers who obtained truck service apparently could ship at lower rates, the railroads were sure of retaining most of the traffic and did not extend greatly reduced rates to all shipments.

Still another variation in the formula relating rail rate changes to truck costs is required for shipments originating in locations not previously accessible to low-cost water transport. When shippers in such areas can—through highway improvement or intensified truck competition—reach barge lines by using a short truck haul, the unregulated carrier costs which rail rates must match are those of trucks and barges—for the combined haul—usually substantially below the all-truck cost of reaching the same destination.

Statistical Verification.—None of these modifications invalidate the hypothesis advanced earlier concerning rail response to intensified intermodal competition. But they pose problems for its statistical verification. If it could be assumed that the competition to which railroads responded always came from truckers whose own costs of providing service could be measured at the cost per highway mile of moving fully loaded, no problem would exist. The hypothesis could be verified or rejected by relating actual rail rates before and after reductions to the estimated level of truck costs for moving between the same points. A statistical finding that the change from old to new rates had moved rail charges into line with truck costs would confirm two expectations concerning the intercarrier competition.

First, it would show that intensified competiton for particular traffic originated in the unregulated or freely competitive segment of the transportation industry and that rail rate reductions occurred in response to traffic erosion caused by truck rates. Second, if the reductions railroads sought (or perhaps the maximum reductions they were permitted to make) were ordinarily restricted to bringing the new rates into the range of truck costs, their maximum effect would be to halt diversion of traffic at some point, or to achieve a limited rollback of the motor carriers' share. Traffic would continue to be divided between the two modes, assuring shippers that intermodal options would be available for a maximum number of routes.

Conversely, a failure of the trend in rail rates to show a correlation with truck costs would suggest that intermodal competition might often eliminate one or the other carrier type from a substantial share of contested traffic movements.

In dealing with the rate changes that have actually taken place, however, so clear-cut a result cannot be expected. The competitive pressures faced by railroads in particular instances cannot always be measured by a uniform estimate of truck costs calculated according to a single formula. Individual rate reductions may be responsive to competitive rates set according to any of several cost calculations by any of several competitors (or combination of them). Detailed analysis of each rate change would be needed to establish the relevant cost comparison for each.

Despite these known variations in the intensity of competitive pressure, it has seemed worthwhile to apply the techniques of multiple regression analysis to a sample of "before and after" rail rates, relating them to the estimated truck cost for the same service based on the round-trip highway distance traveled by a vehicle with a full load in both directions. Wide geographic coverage was sought, and observations were limited to reductions in rates applicable to single car movements. (Rate concessions made by providing a new lower multiple or jumbo car service in addition to standard rates do not provide comparable "before and after" charges.)

Using a dozen pairs of origins and destinations where both new and old grain rates are for single-car movements, a linear regression analysis indicates that such changes did bring rail rates more closely into line

with the costs of their truck competitors. The old rates did not show a statistically significant relationship with truck costs for providing comparable service, but the new rates did. And this orientation of railroad ratemaking toward the costs and capabilities of the competing carrier is further confirmed by the fact that neither old nor new rail rates were significantly related to the railroads' own cost of providing service.

More observations would be needed to prove conclusively that rail ratemaking in general is determined by competitors' costs, but the extent of reductions made in cases for which comparable grain rates could be obtained indicates that they were closely geared to the competitive pressure imposed by the lowest price the alternative carrier could affort to charge for equivalent service. Even using a standard formula for estimating truck costs, the regression coefficient of .77591 between new rail rates and truck costs is statistically significant to the 5-percent level; a closer fit would likely be obtained if cost estimates for the competing mode could be tailored to the circumstances of each transport market.

For instance, a simple inspection of rates for the hauls used in this analysis shows three instances where recent reductions cut the new rates to unusually low levels relative to the distance involved: Evansville, Ind.-Augusta, Ga.; Hastings, Nebr.-New Orleans; and Salina, Kans.-New Orleans; all of these reductions were actually responses not to straight-mileage truck costs but to the increasing use of short truck hauls combined with low-cost barge transport. Where new rates remain comparatively high relative to highway mileage, they may be explained by the limited volume of reverse-flow traffic over the same routes and the consequent shortage of trucks willing to make the haul for less than their full round-trip costs. In one such instance (Des Moines to Fort Worth) the new rail rate equals about 90 percent of the round-trip truck cost.

Considered together with the competitive circumstances surrounding selected rate cuts, this is persuasive evidence that recent rail rate reductions have been responsive to increasing competitive pressures for specific traffic movements and that these responses in general conform to the pattern described earlier.

CHAPTER 10—THE FUTURE OF COMPETITION

Adequacy of Multimodal Competition

The regulation against rail participation in other modes of transportation stems from concern that rail carriers—if free to offer combination service to farm product shippers—could eliminate competition and create a monopoly.

From the standpoint of shippers, effective competition is not measured by the number of carriers bidding for the same traffic over the same route, but by the availability of alternative means for moving produce to the same or alternative markets. For many shippers of farm products, this need might be better satisfied by two carriers—each able to provide multimodal transportation to a major market (not necessarily the same market)—than it is by a larger number of carriers each representing a single type of service. In locations far from both markets and waterways, the competition from highway carriers is usually weaker than that which might develop if railroads could compete with each other by offering combination service throughout the territories between their lines.

To some extent, the physical fact that alternative rail routes have become readily accessible by truck is already benefiting producers in areas where shippers themselves take the initiative in diverting traffic to the lower-cost line. But direct multimodal competition between carriers might be more effective and thereby reduce the number of the remaining rail shippers who must move products to distances beyond the effective range of truck (or truck-barge) competition.

Permitting multimodal competition to develop might tend to widen rather than narrow the present range within which competitive transportation alternatives are available to shippers. Many gaps around the periphery of intermodal competition for farm product traffic might be eliminated. Whether such multimodal competition would actually assure shippers the best transportation service at the lowest possible rates may be challenged because the number of competitors might be limited. The effectiveness of competition among small numbers depends greatly on individual circumstances.

The particular circumstances under which carriers compete for transportation business would not seem to encourage restrictive pricing in many circumstances. Patterns of traffic competition are much more complex than the conventional competitive situation, and the number of competitors is not limited to those seeking to move the same commodity over the same route. Alternative combinations of transportation service can divert the traffic to other destinations usually reached by different carriers. Moreover, highly effective competition may exist between two widely separated carriers, each seeking to move a given commodity from different origins to a single destination (ch. 6).

The demand schedules faced by individual carriers are far more elastic than the total demand for transportation of all farm products. Potential traffic gains from moderate rate reductions are often great, while the pressures generated by such diversionary (or ricochet) competition tend to be indirect and diffuse. This greatly reduces the likelihood of restrictive pricing, as does the ability of many shippers to bypass for-hire carriers entirely by acquiring and operating their own equipment.

Moreover, the incentive to engage in restrictive pricing may be less in the transportation field than in some manufacturing industries. Rail carriers, with their chronically excess capacity, generally stand to improve operating efficiency by attracting greater amounts of traffic rather than restricting their level of operations so long as such restrictions cannot be accompanied by downward adjustments in capacity. None of these factors constitutes a guarantee that all shippers could always obtain service for the lowest rates multimodal carriers could afford to offer, but the degree of protection they might receive from multimodal competition would seem likely to equal that available to the customers of most industries.

Economic Advantages

At the same time, competition among multimodal carriers who were free to choose the least-cost mix for individual hauls would likely be more effective in promoting economic efficiency in resource use than is restricted intermodal competition. At any time, the most efficient means of moving farm products to market depends on current transportation technology. Competition among multimodal carriers could compel the carriers involved to find and use the lowest-cost combination of modes possible and also to innovate and adopt improvements in the future.

In terms of aggregate economic efficiency, the most significant potential contribution of multimodal competition lies in the solution it could provide for the problems of excess rail capacity. Less regulation of rail ratemaking would simply permit rail carriers to obtain more traffic and thereby use their existing capacity more efficiently. This might result in a net gain. So long as the costs associated with fixed rail capacity cannot be adjusted downward (that is, wherever fixed costs are truly fixed), it may be cheaper for the economy to use that capacity than to meet the irreducible expenses associated with it and also incur the further cost of moving products by other means.

But the growing feasibility of combining two modes of transportation in the same haul introduces the possibility of eliminating an important share of the expenditures associated with underutilized rail capacity. It is becoming technologically feasible to "cure" the problem of excess rail capacity partly by improved use and partly by abandonment of inadequately used facilities.

In any rail system, the geographic incidence of excess capacity is disproportionately concentrated in lightly used branch mileage; main lines in corridors of heavy traffic operate much nearer their most efficient level or may even be pushed beyond that point at peak seasons. Disparities in traffic density have always existed and the costs associated with low density were technologically unavoidable so long as the Nation's railroads had to constitute a complete and self-contained transportation system. Maintaining the low-density portions of that system was a necessary cost of collecting products from isolated origins and delivering them to multiple destinations.

Technological progress in truck transport and reductions in the cost of transshipment have reduced the Nation's needs for such a complete rail network. Indeed, from a technical standpoint, the most efficient transportation system might now be one which substituted truck feeder service to main-line points for any branch where the actual or potential density of traffic did not warrant the cost of maintaining it in service.

For those interested, a comparative study of railroad costs for systems of varying size was made in

1961.[60] It indicated that conventional economies of scale were unimportant, since all railroads were large enough to achieve the significant ones. The efficiency of operations increased rapidly with increased traffic density per mile of track up to an average annual density of $50,000 per mile. The study showed no further gains thereafter. But these figures were averages for entire rail systems, combining both main and branch line mileage; a true determination of optimum density would require a further breakdown. It must also be remembered that each installation of automated track and other automated facilities or any improvement designed to cut labor costs or speed service increases the carrying capacity of given mileage. Thus the traffic density associated with the most efficient level of operations tends to rise over time.

A liberal policy by public authorities toward permitting abandonment of underutilized branch lines might foster the development of more coordinated service between rail and truck carriers. But even if railroads were generally free to eliminate capacity for providing service which could be offered more economically by other modes, this would represent only a partial solution. So long as rail carriers are unable to offer shippers origin-to-destination service through a combination haul, they will be reluctant to abandon rail service to particular localities for fear of losing much of the traffic originating there. Since truckers serving the area would seek, where possible, to move shipments all the way to destination, rail carriers cannot tell how much of the traffic now originating on low-density branch mileage they would be able to retain for the main-line portion of the haul through coordinated service with independent truck operators. Faced with this uncertainty, they might hesitate to seek abandonment in cases where considerable traffic was at stake.

If, however, they were able to bid for such traffic at origin by offering multimodal service directly to shippers, decisions to retain or abandon branch mileage would rest solely on the relative cost of providing service by rail or by combination haul. The maximum increase in economic efficiency of the Nation's transportation system thus might depend on reducing obstacles both to the abandonment of underutilized rail mileage and to the provision of multimodal service by rail carriers. Overhead cost for maintaining excess capacity would be reduced by substituting truck service for portions of the haul where it was economically more efficient. Multimodal service for farm product traffic would also test—in one major segment of transportation—the self-regulatory effectiveness of this form of competition in allocating traffic and assuring shippers adequate service at competitive rates.

Potential Advantages

Even if ratemaking freedom were granted to permit more efficient rail operation, however, intermodal competition would still fall short of assuring the best transportation that recent technological developments make possible.[61] So long as railroads maintain full branch-line facilities, they have an incentive to obtain shipments—if they can—from origin to destination rather than to participate in joint hauls. Less regulation of rail rates, if it were not accompanied by any other changes in regulatory treatment, would only enable the railroads to compete more effectively against the growing trend toward truck-barge service.

Choices among alternative modes of transportation for different hauls lead logically to selecting the lowest-cost "mix" among transport modes for a given haul. Technical developments in recent years—piggyback service for loaded truck trailers on rail flatcars, containers that can be interchanged readily among modes of transport, and improved loading and handling techniques of all sorts—have been reducing the physical barriers to transshipment. It is rapidly becoming possible to combine in a single haul the special advantages of different modes for separate portions of the same traffic movement.

The present compartmentalization of transport modes, however—particularly the rigid rule prohibiting railroads from engaging freely in the business of other carrier types—tends to limit the spread of these advantages. In theory, coordination of service among independent rail, truck, and barge carriers could offer the rate and service benefits of multimodal service to the shipping public. But where each carrier sees profit advantages to itself in retaining every shipment for as

[60] Kent T. Healy. The Effects of Scale in the Railroad Industry. pp. 1-5. Com. Transp. Yale Univ. 1961. Other references are: Kent T. Healy. The Merger Movement in Transportation. Amer. Econ. Rev. LII(2): 436-444. May 1962, and G. H. Borts. The Estimation of Rail Cost Function. Econometrica, p. 108, Jan. 1960.

[61] Lee J. Melton, Jr. The Transportation Company: An Economic Inevitability. Highway Res. Bd. Proc. 39: 39-45. 1960.

large a portion of the total haul as possible, each resists surrendering traffic.

Even so, combination service by truck and barge operators (with or without common ownership) has increased, since each carrier obtains a mutual benefit from extending lower-cost transportation service to shippers whose traffic otherwise might not move or might move entirely by rail. But the obstacles to providing truck-rail or barge-rail combinations have limited joint service between these modes largely to hauls where shippers have explicitly chosen to utilize both carrier types. Even in those circumstances, railroads have often sought to retain traffic on rail lines from origin to destination by minimizing the potential advantages shippers could gain through transshipment.

Railroads cannot use their motor equipment to provide feeder service to their rail lines beyond rigidly defined pickup and delivery areas. At the same time, they are plagued with chronically underutilized capacity, particularly over the branches which feed traffic into their higher density main lines. The railroads, therefore, have every incentive to resist participating in joint hauls by competing for traffic at points of origin through to destination. Freedom to offer multimodal service, on the other hand, would motivate them to provide the most efficient transportation mix for each haul.

Some Views on Reduced Regulation of Rail Ratemaking

Opponents of reduced regulation of rail rates usually contend that benefits from allowing rail carriers to compete freely for farm product traffic could be temporary and self-defeating.[62] This contention rests on two premises: first, that marginal cost pricing by the railroads could permit them to obtain traffic which they would not carry indefinitely at rates below their full average cost of providing service; and second, that elimination of rival carriers from any given traffic movement could restore the railroads' quasi-monopoly position for particular groups of shippers. This, in turn, might permit the railroads to reestablish rates at levels above those previously available from truck or barge operators. The special circumstances of intermodal competition, however, cast doubt on both premises.

Ability to Maintain Competitive Rates

The first premise assumes that the true low-cost bidder for any traffic movement must always be the carrier with the lowest average total cost (service-equivalent) because it is taken for granted that no carrier would or could sustain indefinitely any rate which did not fully cover the cost. For rail carriers, this is by no means always the case. Most railroads usually operate at less than their most efficient level—at least, over many routes. As demonstrated in chapter 7, historical costs based on current or recent levels of operation generally are higher than the best potential average total cost which a railroad could achieve through increased traffic volume. This "best potential cost" may be below the rate needed to attract the added volume which would permit its achievement; even where it would not, rates may persist indefinitely at levels which do not cover all costs of irreducible physical capacity. A carrier with capacity for handling more traffic than it can attract on a full-cost basis often improves its position by obtaining additional traffic at lower rates; so long as capacity cannot be adjusted downward—as is often true for rail carriers—the carrier may continue indefinitely to be better off with this additional traffic than without it.

Probable Need to Maintain Competitive Rates

Critics of less regulation are convinced that such rates would not continue, because they take it for granted that competitive pressure would disappear from any traffic movement in which other carrier types ceased to participate. Such a view is implied in the National Transportation Policy of the Interstate Commerce Act which states in part: "It is hereby declared to be the national transportation policy of the Congress to provide for fair and impartial regulation of all modes of transportation subject to the provisions of this Act, so administered as to recognize and preserve the inherent advantages of each. . ."

Bids by the railroads for certain traffic at rates below fully-distributed cost show that certain shippers—by reason of favorable location of traffic volume—have access to lower cost transportation alternatives—either from for-hire carriers or through the acquisition of their own highway or waterway equipment. These shippers would be likely to retain

[62] J. W. Hershey. The Rest of the Story on: The Role of Cost in the Minimum Pricing of Railroad Services. Univ. Chicago, Jour. Business Vol. XXXVI, No. 3.

alternatives whether or not a particular traffic movement continued to be actively divided among carrier types. The flexibility inherent in motor and waterway operations tends to assure this result. Even over routes where active competition did not currently exist, potential competition would remain a real and present barrier to the establishment of unduly high rates.

A brief consideration of cutthroat pricing, as this is usually described, will show why this is true. The expectation that a competitor who eliminates rivals by cutthroat competition will later be able to establish high monopoly prices rests on the assumption that these prices will not attract new entries into the industry. This supposition is reasonable in some circumstances, because potential rivals would realize that the price-cutting process could be repeated at their expense.

But the characteristics of easy entry and geographic mobility of for-hire truckers engaged in the transportation of farm products minimize their vulnerability to such tactics. Marginal cost ratemaking by rail carriers might largely exclude truckers from certain business that they now have, particularly intermediate hauls. But if this occurred, for-hire truckers would still be carrying a large share of farm products either direct from origin to destination or to barge loading points. Owners of truck or barge facilities used primarily in hauling their own traffic would also continue to have capacity available on a for-hire basis, either regularly or occasionally. For both groups, the geographic flexibility of their equipment and the absence of regulatory constraints over origins and destinations served in interstate commerce would permit either permanent relocation or temporary diversion of equipment in response to profit prospects. While most truckers specialize regionally to some extent, many regularly divert equipment in slack periods, and all possess potential operating flexibility. Moreover, some shippers could acquire transportation equipment either through lease or purchase.

If railroads were permitted to engage in unregulated rate competition, they would almost certainly increase their share of farm product traffic largely on a geographic basis—that is, by preempting traffic for which truck and barge costs (service-adjusted) were relatively highest. But the fear that they would then be able to price their services as monopolists—often presented as the inevitable outcome of less rate regulation—appears greatly exaggerated. It appears more likely that a modification in the regulatory framework to permit railroads more freedom in agricultural ratemaking would improve the present performance of intermodal competition, at least in terms of economic efficiency. Shippers' aggregate transportation costs would likely be lower, and fuller use of rail capacity should reduce the total cost of transportation to the economy in terms of resource utilization.

CHAPTER 11.—INTERMODAL COMPETITION—AN OVERVIEW

The problems posed for the railroads by the growth of competing modes may warrant some revision in transportation policies. Amendments to the Interstate Commerce Act in 1958 made certain concessions to railroad demands for greater latitude in setting competitively effective rates.[63] The ICC was instructed not to hold the rates of one carrier type up under competitive conditions to protect the traffic of another, but the law does not make clear how rates set in response to competition should relate to the costs of the carrier making a cut. A more fundamental economic question is whether intermodal competition, made possible by modern technology, has changed the appropriate goals and techniques of transportation policy.[64]

In the specific area of farm product transportation, unequal regulation of railroads and their competitors has led to explicit proposals for equalizing that treatment. These have ranged from no regulation of rail rates on this traffic to complete regulation of rates for other carrier types. Policy judgments on the proposals require evaluation against broad economic

[63] Transportation Act of 1958, enacted Aug. 12, 1958.

[64] Dudley F. Pegrum. Investment in the Railroad and Other Transportation Industries Under Regulation. Amer. Econ. Rev. XLVII(2): 416-429. May 1957; also Ivon W. Ulrey. Problems and Issues in Transportation Policy and Implications for Agriculture. Jour. Farm Econ. 46(5): 1281-1289. Dec. 1964.

criteria of the actual and potential impact of intermodal competition on the economy as a whole.[65]

This chapter reviews briefly the economic impact of such competition as it has developed within the prevailing policy framework, and then explores some implications for its further development under varying policy assumptions. The question raised initially in chapter 3 concerned the ability of other carrier types to sustain intermodal competition with rail carriers under unregulated rail ratemaking. The detailed analysis in later chapters suggests, however, that this question should be expanded to ask what policy framework would best promote an economically efficient allocation of traffic among carrier types. Such an allocation would minimize both the direct money cost of transportation to shippers in the aggregate and also the cost in terms of resource utilization to the economy as a whole. Long-range efficiency also entails the provision of maximum incentives to realize future savings through innovation and improvement.

Developments

The physical possibility of providing better and cheaper transportation has been a product of technological progress and continuing improvements in the rail, public highway, and waterway systems. But that possibility has been translated into lower rates and more convenient service largely as the result of specific competitive pressures among carriers seeking to gain or retain traffic over particular routes. These pressures have not stemmed exclusively from carriers engaged in for-hire transportation. Many shippers have realized savings by purchasing and operating their own highway or waterway equipment, and the possibility that others might do so has exerted pressure on all for-hire carriers to implement technical improvements and pass savings on in the form of lower rates or better service.

But competition among for-hire carriers for farm product traffic has been intensified and increased because movements of unprocessed agricultural products fall into the competitive sector of transportation for trucks and, where they move in bulk, for barges also. The longstanding policy decision to permit relatively free competition by such carriers for this business was responsive to the special needs of agricultural shippers for geographic flexibility in transportation service, and the special capabilities of unregulated truck and barge operators in meeting those needs has facilitated the geographic spread of intermodal competition.

The need for adequate transportation for farm output at times, in quantities, and over routes which change from year to year and are dictated by unpredictable variations in weather or other factors which influence production and marketing patterns was explained in chapter 1. Highway transport, either singly or in combination with waterway transport, is well adapted to meeting these needs. Entry into the business of transporting unprocessed farm products to interstate destinations is readily open to new carriers, and there are no regulatory constraints to prevent extension of service to changing combinations of origins and destinations. Carriers have both the incentive and ability to offer service to shippers in additional locations whenever this becomes possible through decreasing costs or improved assessibility.

For-hire motor and barge operators, therefore, have generally taken the initiative in extending intermodal competition for farm products to more and more shippers in a widening range of locations.[66] At any time, the outer geographic limit of service is set by truck or barge costs in relation to existing rail rates, and the extension of transportation alternatives to these limits brings pressure in turn on rail carriers who respond to the actual or proposed diversion of traffic by seeking—through regulatory channels—to reduce rates or improve service or both. The reductions typically bring rail rates about into line—on a service-equivalent basis—with the lowest rates at which competing carriers can offer service over the same or alternative routes. Once such an adjustment has taken place, the specific sequence of challenge and response initiated by intensified truck or truck-barge competition is concluded.

At competitive rates established in this way, the carriers seeking this particular traffic will divide the business in some proportion, and the new rate levels will continue until further innovations or improvements enable one or another carrier to lower rates or

[65] Committee on Interstate and Foreign Commerce. Transportation Amendments of 1964. pp. 1-5. 88th Cong., 2d Sess. House Rpt. No. 1144.

[66] Ch. 2, table 10.

extend the competitive service range or both. Such innovations have been introduced by truck or barge operators more frequently than by rail carriers because regulatory policies and procedures, industry traditions, and—in many instances—financing difficulties combined to limit initiative by railroads. Both the accomplishments and limitations of intermodal competition as currently applicable to farm product traffic are inherent in this summary of the process through which intermodal competition has occurred.

Achievements

Many rates for traffic sought by two or more carrier types have been reduced since 1958, though not necessarily to the lowest level at which any carrier could provide service. At the same time, more shippers have been offered a choice between carriers with differing service characteristics, while competing carriers have been under pressure to improve service in terms of speed, reliability, and efficient handling. Transportation bills for hauling farm products have been lower than they would have been without intermodal competition, and service has been better—an important consideration in the case of perishable products whose market value depends on the number of metropolitan centers they are able to reach and on their quality at arrival.[67]

Limitations

Limitations on the achievements currently attributable to intermodal competition are partly geographic and partly due to the structural and historical problems which have led to continued regulation of rail carriers. The geographic limitations exist because truck and barge carriers cannot provide equally effective competition for railroads for all product categories between all origins and destinations. Some shippers remain outside the periphery of intermodal competition. Shippers in favorable locations enjoy greater savings than those in locations where there is less traffic competition.

Where the less favorable located producers compete with others who have benefited more from improved truck, barge, or truck-barge service, the relative position of the former has been adversely affected. Moreover, as explained in chapters 2 and 4, this adverse impact has increased in many instances because the principle of group ratemaking applied to many farm products by the railroads prior to the growth of competing modes equalized transportation costs among many of these unequally located producers.

The shifts now occurring as a result of intermodal competition favor producers who are located near markets (or processing centers) or who otherwise have access to low-cost transportation. When judged against broad economic criteria of effective resource utilization, these changes operate to increase overall efficiency. They reduce the total transporation bill for shippers; they also encourage location (or relocation) of producing, marketing, and processing facilities so as to minimize total costs of production and distribution—including transportation costs.

These broad economic advantages are partly offset in the short run by individual losses inflicted on producers or processors who had benefited from the old rate relationships. Such losses, incurred in achieving greater overall transportation efficiency, represent what Meyer, et al., have called "a transitional capital cost problem."[68] Some who are alarmed by the disruptions in existing competitive relationships propose to avoid this problem by freezing rate structures.

Freezing rate structures, even if it were desirable, would not preserve traditional competitive relationships unless legislation was enacted to prevent favorably located shippers from acquiring their own highway or waterway equipment. More important, however, is the fact that freezing rate relationships by regulation in an attempt to prevent immediate losses to some would impose longrun losses on the economy as a whole by perpetuating uneconomic conditions. Continual adjustment to new conditions, particularly those growing out of technological change, is a basic characteristic of competitive markets and plays an important part in the process of economic growth.

Limitations on intermodal competition, caused by unequal regulation over carrier types, poses a more

[67] Robert M. Bennett, Interstate Trucking of California-Arizona Fresh Fruits and Vegetables by Rail and Truck. U.S. Dept. Agr. Mktg. Res. Rpt. 673, p. 23. Aug. 1964; Joseph R. Corley. An Analysis of Grain Transportation in the Northwest. U.S. Dept. Agr. ERS-200, p. 20. Dec. 1964; Mildred R. DeWolfe. For-Hire Carriers Hauling Exempt Agricultural Commodities, Nature and Extent of Operations. U.S. Dept. Agr. Mktg. Res. Rpt. 585. May 1963.

[68] John R. Meyer, Merton J. Peck, John Stenason, and Charles Zwick. The Economics of Competiton in Transportation Industries. Harvard University Press. 1964.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1969--343-495/ERS-63

complex problem. Makers of public policy, confronted with rail demands for unregulated ratemaking, face a dilemma in deciding how best to serve the public interest (ch. 5 and 7). Fears by shippers and others that rail carriers—if allowed to compete freely for traffic—could destroy rivals and eliminate competition have been partly responsible for the restricted rate reductions which the ICC has permitted the railroads to make. Such limited competitive reductions tend to assure shippers over any given route of a continuing option between the services of two or more carrier types, but such competition often will not result in rates as low as the lowest which railroads could appropriately offer to obtain particular traffic (ch. 9).

The overall gains of intermodal competition are thus limited largely to those brought about through truck and barge initiative. Once rail rates have been brought into line with the costs of competing carriers—a process which may nearly have worked itself out as is suggested by the empirical data in the preceding chapters—further benefits depend mainly on the prospect for continuing improvements in the technology of truck, barge, or combination truck-barge transport. At the same time, railroads are denied equality of treatment with their competitors in their efforts to earn a satisfactory rate of return, and are also prevented from realizing the savings which would follow from higher and more efficient use of existing capacity.

Shippers and the economy as a whole likely could receive greater potential benefits from intermodal competition than those already realized if rail carriers could be allowed to compete more freely. Given the acknowledged differences among carrier types in cost structure and ability to make capacity adjustments, the problem of achieving this objective does not have an obvious and easy solution. But certain policy implications can be drawn.

The illustrations and analysis in this study relate specifically to the special circumstances that have shaped intermodal competition for farm product traffic. But the broad improvements in transportation technology which have underlain those developments apply to all commodity movements. The potential effectiveness of competition among multimodal carriers able to offer shippers the lowest-cost mix of transport service has logical relevance to the Nation's transportation system in general. These factors would seem to warrant further examination of the increasing potentialities of relying more heavily on competition as a self-regulating allocative mechanism to provide multimodal transportation service.